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Assessing the influence of religion on health behavior

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ASSESSING THE INFLUENCE OF RELIGION ON HEALTH BEHAVIOR

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ABSTRACT

A primary aim of this study was to confirm the factor structure of the Health and Religious Congruency Scale (HARCS), a measure previously developed by the same research team. The HARCS questions directly link religious beliefs/activities to health behaviors. Confirmatory factor analysis (CFA) showed that the current data fit poorly to the factor structure found in the pilot study. Because the current sample was more religiously diverse than the pilot study sample, and could potentially provide a factor structure that better reflects the views of individuals from different religious affiliations, a principal components analysis was conducted on the current data. CFA was then performed on combined data from the pilot study and current investigation.

The resulting factor structure had acceptable Goodness of Fit Indices. After eliminating one scale because of highly skewed data and limited utility, and two other scales because of poor test-retest reliability, validity tests were performed on the four remaining HARCS subscales and the total score of the HARCS. Subscale 1 is related to the general influence of religion on drinking and smoking. Hierarchical regression showed that religious variables, drinking and smoking behaviors, age, and an interaction between religion and drinking/smoking accounted for approximately 50% of the variance in the subscale. Subscales 2-4 were related to the impact of religion on eating, physical activity, and weight. Religious variables, health behaviors, and age accounted for small amounts of variance in these scales. In subscales 2-4 few participants endorsed that religion impacted the health behaviors of interest.

Overall, results provide further support that from a religious perspective drinking and smoking behaviors are viewed differently than eating and physical activity. The four subscales have adequate reliability, however, the three subscales pertaining to exercise, eating, and weight appear to have little relevancy to the general population. In contrast, subscale 1 appears to have utility with individuals of various religious orientations. For this reason, future studies should consider using subscale 1 without the other subscales. Future studies will be required to determine if the other subscales are valid and useful among select groups such as those participating in faith-based health programs.

INTRODUCTION AND REVIEW OF THE LITERATURE

The Complexity of Health Behavior

Personal health is in part the result of volitional behaviors. However, a number of biological and environmental factors clearly influence behaviors such as eating, exercise, smoking, and alcohol consumption. These genetic and situational variables, which can be synergistic or oppositional to each other, often pose considerable challenges for the individual trying to lose weight, sustain a daily exercise regimen, stop smoking, or remain sober. Therefore, researchers who study health behaviors should consider "personal choice" in the context of dispositional, social, and cognitive influences.

Research has illustrated that health behaviors are subject to marketing, availability, modeling, and expectancies (Birckmayer, Holder, Yacoubian, & Friend, 2004; Booth et al., 2001; Copeland & Carney, 2003). For example, cigarette smoking and alcohol consumption are influenced by cost, exposure to advertisements, and use by parents and peers (Birckmayer et al., 2004). The belief that substance use is fun or will relieve unpleasant feelings is also related to increased use and likelihood for subsequent addiction (Hardert & Dowd, 1994; Schmid, 2001). Environmental studies of physical activity patterns have demonstrated that adults will become more physically active as sedentary activities become less convenient and physically active alternatives are made more accessible (Raynor, Coleman, & Epstein, 1998; Saelens, Sallis, Black, & Chen, 2003). In addition, poor eating behaviors and increased body weight are positively associated with television viewing (Kronenberg et al., 2000). Behaviors such as smoking, drinking alcohol, eating, and physical activity take place in an environment in which the benefits of healthy choices, and the negative consequences of unhealthy decisions, are highly publicized. Therefore, health behaviors are clearly influenced by multiple reinforcement contingencies, often operating simultaneously. That is, reinforcing consequences exist for both engaging in a particular health behavior and choosing to refrain from that same behavior.

Because of the complexity of these influences, scientists have sought to elucidate overarching physiological mechanisms or psychological belief systems related to health behaviors. For example, the

discovery of leptin led to a greater understanding of hypothalamic peptides important in appetite regulation (Bray, 2003), and the study of the neurotransmitter dopamine has shed light on the neurophysiology of addictive behaviors (Kalat, 2001). In addition, a variety of psychological theories have been proposed to explain and/or predict health behaviors. In general, these theoretical models include variables that are believed to determine how appealing an alternative behavior is compared to a current behavior. Although these theories emphasize the cost/benefit analysis of behavior, they are characterized by subtle differences in the conceptualization of the contributing factors.

Social-Cognitive Models of Health Behaviors

The development of the Health Belief Model (HBM) is generally regarded as the beginning of systematic, theory-based research in health behavior. With its inception in the 1950's, the model was used to explain and predict preventive health behavior such as X-rays for tuberculosis (TB) screenings (Hochbaum, 1958). The original HBM (Hochbaum, 1958) proposed that the perceived likelihood of negative health consequences, the severity of these consequences, and the perceived effect of a precautionary health behavior predict attitudes and behavior. Hochbaum's seminal work showed that individuals who believed they were susceptible to TB, and also thought that X-rays would be beneficial in detecting and preventing the disease, were very likely (82% of the participants) to obtain voluntary X-rays. By comparison, only 21% of the individuals who held neither of these beliefs obtained a voluntary X-ray. Hochbaum also believed that health protective action was often instigated by cues such as bodily events, environmental stimuli, or media publicity, though he never tested this hypothesis.

Over time the HBM has evolved and additional variables have been considered important to the model's suitability to predict behavior. For example, the cost of precautionary behaviors is also considered an important factor in the HBM (Streecher, Champion, & Rosenstock, 1997). That is, the higher the cost, or barriers that must be overcome, the lower the likelihood of action. Costs are generally associated with elements such as time, money, pleasures, or interpersonal factors. Although the original

model was applied somewhat narrowly to screening for disease, many studies have since applied the model to a wide range of illness prevention behaviors.

The HBM has been tested in a variety of studies and its constructs are, at best, moderately associated with behavior (Ogden, 2003). Despite the fact that most studies have shown a great deal of unexplained variance when using the model, the HBM continues to be expanded and is used as a basis for designing and measuring the effectiveness of interventions (Abood, Black & Feral, 2003; Wdowik, Kendall, Harris & Auld, 2001). The model has been criticized because it does not account for other important variables including cultural factors, socioeconomic status, and previous experience (Soliday & Hoeksel, 2000). In addition, Weinstein (1993) stated that because the HBM lacks a combinatorial rule, it is more akin to a short list of variables than a true theoretical model. Despite this, many investigators and clinicians have found these individual variables useful when attempting to understand the complexity of health behaviors.

The Theory of Reasoned Action (TRA; Fishbein & Ajzen, 1975) is another model that has been applied to health behaviors. In the TRA, intentions are considered proximal predecessors of behaviors. According to Fishbein and Ajzen, intentions are determined by attitudes about the behavior and by subjective norms. Attitude is conceptualized as an individual's overall evaluation of performing the behavior (e.g. "for me exercise would be beneficial"). These attitudes are formed by perceived probability of behavioral outcomes, perceived severity of outcomes, and perceived value of outcomes (Weinstein, 1993). Subjective norms refer to the influence that other individuals have on a person's behavior. In the TRA, social pressures are proposed to impact behavior (e.g. my friends and family want me to stop smoking). After the development of the TRA, research indicated that this theory had at least one major limitation; the TRA was poorer at predicting intentions when individuals perceived that they had little control over their behaviors or attitudes, compared to when their perception of behavioral control was high (Godin & Kok, 1996).

Due to this limitation, Ajzen (1991) added the *perceived behavioral control* construct to the theory and referred to the revised model as the Theory of Planned Behavior (TPB). The inclusion of perceived

behavioral control as a predictor of behavior assumes that if behavioral intention is held constant, behaviors that are considered highly controllable are more likely to occur than those that are perceived to be less controllable (Armitage & Christian, 2003). A number of recent investigations have examined the Theory of Planned Behavior in predicting intentions/behaviors with somewhat mixed results. Studies have shown that the theory can account for moderate amounts of variance for both intentions and behavior. However, the three constructs of TPB (attitudes, subjective norms, and perceived behavioral control) are not consistently predictive across various studies looking at a variety of health behaviors.

Povey, Conner, Sparks, James, and Shepherd (2000) tested the TPB in a prospective study concerning the consumption of a low-fat diet and the ingestion of fruits and vegetables. Results indicated that attitudes, but not subjective norms, were positively predictive of intentions to eat a low-fat diet. In addition, attitudes and subjective norms predicted intentions to eat five portions of fruits and vegetables per day. Unexpectedly, perceived behavioral control was negatively predictive of intentions to consume less fat and increase fruit/vegetable intake. Povey and colleagues also measured self-efficacy, which was shown to be significantly associated with intentions. Their group concluded that self-efficacy was different from perceived behavioral control and in some instances may be a better predictor of intentions. For example, it is likely that most individuals believe that they can choose to eat a low fat diet. However, these same individuals may not be confident that they can carry out the behaviors necessary to achieve this goal. Although this study partially supported the idea that TPB variables predict intentions, the same variables were much less predictive of actual behaviors.

A number of investigators have tested the ability of the TPB to predict exercise patterns. Hagger, Chatzisarantis and Biddle (2002) conducted a meta-analysis of 72 studies applying TPB to exercise. They concluded that each of the components of TPB correlated substantially with exercise patterns. In one study, Norman, Conner, and Bell (2000) showed that the TPB predicted initial exercise intentions and future exercise behavior at six-month follow-up. However, perceived behavioral control was the only construct that predicted both intentions and behavior. In addition, past behavior moderated the

relationship between perceived behavioral control and intentions/behavior. For example, Armitage (2005) reported that past exercise behaviors impact both perceived behavioral control and future behavior. In a within-subjects longitudinal design, Armitage demonstrated that exercise attendance up to week 5 of the study was crucial in determining behavior at 3 months. In addition, perceived behavioral control was the only significant TPB covariate with exercise attendance.

A variety of other theories and behavioral constructs have been applied to health behaviors. For example, the Protection Motivation Theory (Maddux & Rogers, 1983), the Subjective Expected Utility Theory (Edwards, 1954), Social Learning Theory (Bandura, 1977), Locus of Control (Rotter, 1966), and Stages of Change (Prochaska & DiClemente, 1983), all have some utility in explaining health behaviors . However, many of these theories and constructs are overlapping or have components conceptually embedded within each other. In addition, the degree to which these theories or constructs can predict behavior is highly variable. Investigators who examine *single constructs* often find that the construct of interest can only explain small amounts of variance. By comparison, broad, "all encompassing" theories of health behavior are criticized as tautological and untestable (Ogden, 2003).

Religion within a Social-Cognitive Model of Health Behavior

Historically, researchers have not often considered the potential impact of religion within a psychosocial explanatory model of health behaviors. Recent investigations suggest that religion may have positive effects on both physical and mental health (Koenig, McCoullough, & Larson, 2001). These findings have sparked an increased interest in the direct and indirect role of religion on health (Miller & Thoresen, 2003). In addition, the study of the relationship between religion and health appears to be worthwhile because of the number of individuals that are actively participating in their religion. Polling data indicates that 59% of individuals feel religion is at least a very important part of their life (CBS, 2006) and 47% of people report that they attend religious services on a typical weekend (Barna, 2005). Therefore, if religion is in fact an important variable in health behavior, it potentially may influence a number of individuals.

Although the definition of religiosity has been debated, it is generally characterized by an organized set of beliefs and measurable practices within a community of people who accept an authoritative doctrine (Koenig, McCullough, & Larson, 2001). Consistent with this definition are data indicating that religion influences one's choice of friends and impacts life experiences (Walls & Zarit, 1991). Religion may also provide a cognitive framework to evaluate the merits of behavior (Worthington & Kurusu, 1996) and cope with life difficulties (Hill & Pargament, 2003). Therefore, because of its attitudinal, behavioral, and organizational dimensions, religion can be viewed in the context of a social-cognitive model of health behavior.

Religion can be conceptualized within social-cognitive models of health behavior because religious beliefs and practices often influence cost/benefit analyses, value perception, perceived behavioral control, and social influence. In the latter sections of this paper, the link between religion and previously studied health behavior models is discussed at length. Included in this discussion is the notion that the potential impact of religion on behavior could be mediated by personal beliefs and expectancies, by communities that reinforce perceived moral behavior, and through effective (healthy) coping with life difficulties. This association between religiosity and health behaviors seems conceivable only if health behaviors are in some way perceived as a valuable component of personal religious beliefs, religious tradition, or a personal "religious identity". Furthermore, religion is likely to be a more powerful influence of health behaviors when both personal belief systems and religious-based social influences are congruent with each other. The extant literature, although limited in scope, supports the hypothesis that some health behaviors may have religious relevancy while other behaviors do not. The following sections provide a brief review of the relationship between religion and several common health behaviors.

Religious Influence on Cigarette Smoking

In a review of the literature examining the relationship between religiosity and smoking, 96% of the studies reported less smoking by more religious participants (Koenig, McCullough, & Larson, 2001). This inverse relationship appears to hold true across different religions and is independent of age

(Kendler, Gardner, & Prescott, 1997; Khavari & Harmon, 1982; Newcomb, Maddahian, & Bentler, 1986; Oleckno & Blacconiere, 1991). In addition to being less likely to ever begin smoking (Koenig et al., 1998), regular church attendees are more likely to have quit smoking after developing the habit (Gmur & Tschopp, 1987). Using regression modeling, Kendler et al. (1997) reported that personal religious devotion (importance of religion, religious seeking/prayer), religious conservatism (literal belief of the Bible and belief that God rewards and punishes), and institutional conservatism (religious denomination) were inversely related to cigarette smoking. However, Kendler and colleagues did not assess individuals' religious beliefs about smoking or their perception of their church's position on cigarette smoking.

It is estimated that over 90% of smokers begin smoking before the age of 21 (American Lung Association, 2003). In response to this developmental observation, investigators have commonly examined the association between smoking and religion among adolescents. Nonnemaker, McNeely, and Blum (2003) examined data from the National Longitudinal Study of Adolescent Health to test the association of public and private religiosity with adolescent health outcomes. Participants included 16,306 individuals in grades 7-12. This study found that both public (attendance and religious services and activities) and private (prayer and self-reported importance of religion) religiosity were positively associated with abstinence from smoking. Wallace, Brown, Bachman, and Laveist (2003) analyzed data from another national sample of 10^{th} graders consisting of 47,738 Caucasians and 8,266 African Americans. Participants reported religious importance, attendance at religious services, and religious affiliation. Wallace and colleagues found that African American adolescents were more likely to abstain from smoking than Caucasians, but these differences were related to higher religiosity among the African Americans.

The Coronary Artery Risk Development in Young Adults (CARDIA) study was a longitudinal investigation designed to measure the evolution of heart disease in young individuals. The study recruited over 4500 black and white men and women who provided extensive information on their health behaviors and related psychosocial factors (Friedman et al., 1988). Participants, aged 20-32, reported smoking

behaviors, frequency of attendance at religious services, and denominational affiliation in 1987/1988 (Whooley, Boyd, Gardin, & Williams, 2002). Three years later, smoking habits were again measured via interview. Results indicated that baseline and future cigarette smoking were inversely related to religious attendance at the beginning of the study. Among individuals who attended church services once or more per week, 17% reported smoking regularly. By comparison, 34% of those who attended services less than once per month reported smoking regularly. In addition, the study demonstrated that among smokers, high frequency church attendees smoked less than those who attended infrequently. For those who were nonsmokers at the beginning of the study, baseline religious attendance was related to smoking initiation in the three-year follow-up period. Among these participants, 3% of high frequency attendees (once per week or more) began smoking, compared to 7% of individuals who attended church less than once per month.

Religiosity and Alcohol Consumption

Several studies have reported an inverse relationship between religiosity and alcohol use. In teenagers, higher levels of religiosity may protect against underage drinking. In a survey of 13,878 students in grades 7-12, Lorch and Hughes (1985) examined the relationship between alcohol/other drug use and various religious factors such as religious membership, degree of religious fundamentalism/liberalism, church attendance, and personal importance of religion. After controlling for confounding variables, the authors concluded that participants who believed that religion was very important abused alcohol and other drugs less often than those who did not hold similar beliefs. In an adult population, Bazargan, Sherkat, and Bazargan (2004) found that religious participation was associated with a decreased likelihood that individuals seeking emergency medical treatment had drunk alcohol in the six hours prior to their medical visit. Using latent variable modeling techniques, Krause (1991) examined the relationship between religiosity, stress, and abstinence from alcohol in participants 60 years of age or older. Results indicated that health problems were positively associated with abstinence from alcohol, whereas financial stress was related to increased alcohol consumption.

However, religion at least partially mediated both of these associations, showing statistically significant indirect effects on alcohol consumption. Krause also reported that significantly higher rates of abstinence among women and elderly African Americans was primarily due to the indirect effects of religiosity.

In a national study of problem drinking, Cahalan and Room (1972) found that Protestant religious affiliation and attendance at religious services were associated with fewer drinking problems. Results also indicated that there were few abstainers and a greater percentage of heavy drinkers among Catholics and liberal Protestants compared to conservative Protestants. Koenig (1994) examined frequency of Bible reading, prayer, church attendance, time spent watching or listening to religious television/radio, importance of religion, religious denomination and identification as "born again", as they related to alcohol use and dependence. In this study, recent alcohol problems were significantly less common among frequent Bible readers, those who frequently prayed in private, "born-again" Christians, and frequent church attendees. Lifetime alcohol disorders (but not current) were more common among members of Pentecostal denominations compared to members of other denominations. Koenig suggested that this might be a result of Pentecostals proselytizing to individuals within the lower socioeconomic class.

Religion and Exercise

Few studies have examined the relationship between physical activity and religiosity, and the limited studies that have been conducted leave many questions unanswered (Koenig et al., 2001). Oleckno and Blacconiere (1991) reported that highly religious college students were more likely to engage in regular exercise than "low religious" students. In contrast, McIntosh and Spilka (1990) reported that intrinsic religiosity (the internalization of beliefs and practices that are independent of social pressure or personal consequences; Larson & Larson, 1994) was inversely related to exercise. By comparison McIntosh and Spilka showed, in the same study, that intrinsic religiosity was negatively correlated with alcohol use and cigarette smoking. In the large sample of the CARDIA study, individuals

who attended church once per month or more reported less involvement with athletic teams or sports clubs compared to low frequency church attendees (Whooley, Boyd, Gardin, & Williams, 2002).

Strawbridge, Shema, Cohen, & Kaplan (2001) examined religious attendance and physical activity patterns in the Alameda County study. They compared baseline data (1965) with follow-up data (1994). They found that regular church attendees at baseline were more likely than non-attendees to be regular exercisers approximately 30 years later. Baseline measurements of physical activity did not differ according to religious attendance. Therefore, it is plausible that over time, individuals integrate physical activity practices into their religious belief system.

Religion and Diet

The impact of religious affiliation on diet has also not been studied extensively. However, some religious denominations have various prescriptions or proscriptions related to ingestive behaviors. For example, a potentially positive impact of religious denomination on eating habits is evident in Mormons and Seventh-Day Adventists. Mormons have lower rates of cancer and heart disease than the general public, which is likely related to the Mormon health code encouraging consumption of whole grains, fruits, and vegetables (Enstrom, 1989). Seventh-Day Adventists often avoid meat, eating a diet low in saturated fat and high in nutrient density (Hunt, Murphy, & Henderson 1988). In addition to the paucity of data related to church affiliation and eating styles, little is also known about the association between personal religious beliefs and diet. One study reported that a positive relationship existed between extrinsic religiosity (socially motivated) and low-fat dietary intake (Hart, Tinker, Bowen, Satia-About, & McLerran, 2004). This study was limited to participants recruited from a circumscribed region in the northwest United States. Future research is needed to test whether or not the findings of Hart and colleagues generalize to other religious communities that may have different environmental influences or worship practices.

Influence of Religion on Weight

Because self-report of eating habits is often unreliable (Muhlheim, Allison, Heshka, & Heymsfield, 1998), scientists often use objective measures, such as body weight, as an indicator of eating habits and activity patterns. Several studies have examined weight as it relates to religious activity. Results from a large survey of 3,497 people indicated that higher religious practice was more common among individuals who were overweight (Ferraro, 1998). In this national sample, Southern Baptists were found to be heavier than individuals of other denominations. However, this difference was not significant after controlling for race, gender, region of the country, and socioeconomic status.

In the CARDIA study (Whooley, Boyd, Gardin, & Williams, 2002), young adults who attended church at least monthly had a significantly higher BMI (25.7) than participants who attended less than once per month (24.8). Consistent with this finding, Kim, Sobal, and Wethington (2003) analyzed questionnaire data from 3032 adults, and reported that conservative Protestant men had a mean body mass index (BMI) that was 1.1 units greater than those reporting no religious affiliation. This difference was statistically different even when controlling for smoking, alcohol consumption, social support, and stress. Bivariate and multivariate logistic analyses of this data suggested that religious practices may have a social causation effect on weight, rather than religion attracting those who are heavier.

Why is Religion Strongly Associated with Some Health Behaviors but Not Others?

As established in the previous sections, religiosity has been associated with decreased smoking and drinking but is less clearly connected to eating and physical activity patterns. In addition, available evidence suggests that religiosity is positively associated with BMI. The explanation for these disparate findings has not been a topic of empirical investigation. However, research supports the idea that both institutional (moral community) beliefs and personal religious beliefs are related to health behaviors (Richard, Bell, & Carlson, 2000) and therefore should be considered in theories regarding the reasons for these differences. For instance, Cochran, Beeghley, and Bock (1992) showed alcohol use was related to religious affiliation and the strength of this relationship depended on the degree of religiosity. In addition,

Olson and Perl (2001) demonstrated that church strictness (in areas such as eating, tobacco and alcohol use, gambling, and entertainment) was related to religious commitment across several denominations.

The influence of personal religious beliefs and religious social mores may be best understood by placing them within a social-cognition framework of health behaviors. Within this conceptualization, a variety of direct, indirect, and interactive effects of religion can be identified as potential influences of lifestyle choices related to physical well-being. When these influences are predominately health promoting, one would expect religion to be associated with healthier behaviors. By comparison, if for a specific health behavior, some religion-related influences are health promoting whereas others have the opposite effect, religion may be viewed as unrelated to the behavior of interest. However, a more useful formulation may be to consider each single religious influence rather than the sum of the factors. By doing so, the relationship between religiosity and health behaviors can be understood more thoroughly. For example, a pastor may remind his congregation that the body is "the temple of the Holy Spirit" and exhort individuals to "honor God with their body" (*New International Version of the Holy Bible;* 1 Corinthians, 6:19-20). The potential effect of this belief system is that many in the congregation may believe that they should take care of their body. However it is possible that this same church also hosts ice cream socials, has frequent "pot luck" dinners with a variety of unhealthy selections, and provides doughnuts in Bible study classes. In this situation, the belief that one should "honor God with his or her body" by eating healthy is incongruent with the social influences related to diet that are embedded in church activities. Therefore, investigators should consider not only the overall association of religiosity with a health behavior but also the multiple and sometimes opposing factors that contribute to this association.

Health behavior theories incorporate, with various terminology, the cost and benefits of maintaining current behaviors as compared to engaging in alternative behaviors. In a review and comparison of several of these theories (Health Belief Model, HBM; Protection Motivation Theory, PMT; Subjective Expected Utility, SEU; Theory of Reasoned Action, TRA; and Theory of Planned Behavior,

TPB), Weinstein (1993) concluded that there is a consensus that motivation for health protective behaviors stems from the expectation that a behavior can reduce the likelihood or severity of *harm*. In contrast, unhealthy behaviors such as poor diet, smoking, and excessive drinking, are often positively reinforced by pleasurable mood alterations, taste/sensation, or social interaction. In addition, negative affect reduction, relief from boredom, and satiated cravings/hunger can negatively reinforce lifestyle choices. It is plausible that religious factors may also impact health behaviors by directly or indirectly affecting similar reinforcement contingencies. In a religious context, *harm* may be conceptualized as spiritual in nature. Spiritual harm may be thought of as a loss of connectedness to God, which may in turn lead to negative mood alterations. By comparison, the individual who believes he is acting in compliance to God's will may experience a sense of well-being. It is feasible that a devout individual perceives abstaining from drinking and smoking as part of his or her religious commitment. In this line of reason, motivation for abstaining from these behaviors may be partly related to factors such as attaining/maintaining religious commitment, sensing God's approval or presence, and preventing God's disdain. By comparison, eating behavior and physical activity may not be integrated into the religious belief system to the same degree, reducing the likelihood that religious factors will reinforce healthy eating habits and increased physical activity patterns.

Although theories such as the HBM have traditionally focused primarily on health consequences as motivators for health protective behavior, theories such as the TRA, TPB, and SEU consider a wider range of consequences. According to these theories, probability, severity, and value of outcomes are important motivators for intentions and subsequent behavior. For instance, expectancies and value of those expectancies are associated with both alcohol consumption and smoking (Fromme & D'Amico, 2000; Copeland and Brandon, 2002). Copeland and Brandon administered a Smoking Consequence Questionnaire (SCQ) and showed that the product of probability and desirability ratings accounted for significant amounts of variance in smoking rate and nicotine dependence. Although the measure did not query participants about religious-based expectancies, their study demonstrated the importance of

expectancies in smoking behaviors. In appraising the potential impact of religiosity on health, probability, severity, and value may be important factors to consider from a religious context. That is, the probability that the behavior will have religious ramifications, the severity of these consequences (positive or negative), and the value the person places on these outcomes are highly relevant.

Intrinsically religious individuals, by definition, are those who claim that religion lies behind their whole approach to life and carries over to all aspects of daily living (Koenig, 2001). For these individuals, engaging in behaviors that are inconsistent with this belief system should create distress. Therefore, it is likely that lifestyle choices related to fundamental life-guiding principles would be highly valuable to the individual. Based on Dissonance Theory (Festinger, 1957) intrinsically religious individuals would be likely to strive towards engaging in behaviors that are consistent with their beliefs. Another possibility, especially related to attitudes that are not as crystallized, is that viewpoints may change if the person discovers that behaving consistent with those beliefs is extremely difficult. Therefore, in this same vein, if smoking and drinking alcohol is considered incongruent with religious beliefs, these behaviors (especially in the highly religious) will be avoided. By contrast, if beliefs about regular exercise and healthy dietary habits are not as strong, and are perceived as extremely difficult to achieve, individuals may develop the perspective that exercise and diet are primarily unrelated to their religious beliefs.

Literature pertaining to the reasons some individuals choose not to drink alcohol supports the notion that religion may serve as a moral compass for health behaviors. Burkett (1980) studied 323 high schools students, examining attitudes about drinking and drinking habits with several measures of religiousness. Students who believed drinking was a sin were significantly more likely to abstain from alcohol compared to those who did not believe drinking was a sin. Hughes, Stewart, and Barraclough (1985) examined the relationship among drinking practices, attitudes related to alcohol, and religious involvement in a church congregation in England. Church members who completely abstained from alcohol cited their childhood upbringing and the teachings of the Bible as the main factors related to their

abstinence. By comparison, only a small proportion reported that health, expense, or the adverse effects of alcohol on others as important factors. These findings are particularly interesting in light of the many references to wine consumption in the Bible (Jesus turned water to wine, John 2:9; Jesus served wine to his disciples at the Last Supper, Luke 22:17). Although drunkenness is discouraged in Judeo-Christian texts (Isaiah 5:22; Ephesians 5:18), it is difficult to demonstrate that Biblical teachings directly promote abstinence from alcohol. Therefore, other factors may contribute to the findings that highly religious individuals are more likely to abstain from alcohol than non-religious individuals.

Although never empirically tested, it is plausible that avoidance of certain health behaviors, especially alcohol consumption and potentially smoking, may be mediated by a fear of engaging in other behaviors that are perceived as sinful. For example, an individual may feel that drinking alcohol is morally acceptable but the potential behaviors associated with it (drunkenness, sexual impurity, immoral conduct, etc.) are wrong. In addition, the notion that drinking and smoking are more proximal to illegal behaviors, such as underage purchases or drinking and driving, may place them in a different moral context for religious individuals. Nevertheless, these and other views can only be substantiated through future research.

Normative beliefs or social influences are also considered an important factor in health behaviors (Fishbein & Ajzen, 1975). Because choice of friends and social interactions are often influenced by religion, it is possible that the impact of religion on health behaviors is at least partially due to these contextual factors. If an individual's primary network of friends encourages or expects certain behavioral habits, TRA would predict compliance with these expectations. The likelihood of compliance would be based on the degree to which others wanted the individual to engage in the behavior and the person's motivation to comply with their peers' preferences. Olson and Perl (2001) demonstrated that personal time commitment to church-related functions was related to the strictness of the denomination. Therefore, it is possible that individuals of more conservative denominations spend more time together. If so, this

increased time of social interaction would seemingly serve to strengthen the influence of religious-based normative beliefs.

Health behaviors of religious individuals may also be partially the result of the availability or ease of engaging in such behaviors as drinking, smoking, eating, or exercising. It is clear that, independent of religious beliefs, availability impacts health behaviors. Therefore, the "health environment" that the church (or friendships that are a result of church socialization) provides may impact behavior somewhat independent of personal religious belief systems. For instance, individuals who don't believe drinking alcohol is wrong, yet are part of a social network in which few people drink, may drink less. On the other hand, if a church provides a great deal of opportunities for poor food choices and sedentary activities, the result may be that members are more likely to be overweight than those less involved with the church.

The effect of religion on health behavior may also be mediated by coping mechanisms. Folkman and Lazarus (1985) characterize coping as an individual's cognitive and behavioral efforts to manage internal and external demands that are appraised as taxing or exceeding personal resources. In this conceptualization, primary appraisals consist of an individual determining whether or not a stressor is actually challenging or threatening. Secondary appraisals follow when an individual determines whether or not coping resources and options are available to sufficiently cope with the situation (Folkman & Lazarus, 1985). James and Wells (2003) have proposed that an individual's belief system may lead to the formation of religious mental models. These models, or schemas, would therefore affect appraisals of situations and could potentially buffer against mental health problems.

There is abundant evidence that individuals often use religious resources to cope with life difficulties. For example, Koenig and colleagues (1992) studied 850 men over the age of 65 to determine the coping mechanisms they used to deal with medical illnesses and depression. In their sample, 20% of the men responded to an open-ended question stating that religion was a primary factor in coping with their situation and 21% identified religion as "the most important thing that keeps me going". Therefore, religious-based coping may be manifested as faith-oriented cognitive schemas, religious behaviors (such

as prayer or meditation), or social interactions (James & Wells, 2003; Hummer, Ellison, Rogers, Moulton, & Romero, 2004).

If individuals claim to use religion to cope with problems, it is appropriate to ask whether or not these coping mechanisms are indeed helpful. Despite writings by Freud (1927) and Ellis (1980) suggesting religiousness is indicative of emotional disturbance, other studies have contradicted these propositions (Koenig, McCullough, & Larson, 2001). Furthermore, religion is a multidimensional construct and therefore motivations for religious activity, the content of religious behaviors, and the effect of religion on mental health can be quite diverse (Bergin, 1991). Allport (1967) was the first to differentiate between intrinsic religiosity and extrinsic religiosity. Whereas intrinsically religious individuals are likely to find life purpose through their beliefs, extrinsically religious individuals are more likely to "use" their religion for status, sociability, and self-justification. Bergin (1987) concluded that intrinsic religiosity was associated with positive mental health characteristics (decreased anxiety, self control, sociability, sense of well-being, and responsibility) whereas extrinsic religiosity had either neutral or negative associations with these characteristics. Additional research suggests that one's view of God may also impact whether or not religious coping is effective. Those who perceive God as loving and forgiving are more likely to benefit from those beliefs compared to individuals who view God primarily as a punishing judgmental entity (Ellis, 2000).

One benefit of religious-based coping is that individuals may see things from a different perspective and therefore feel less distressed. Even if this coping technique is ineffective in reducing distress, it is possible that attempting to cope via religious means prevents coping through the use of alcohol or nicotine. Therefore the mere fact that religious individuals seek out religious principles, religious functions, and religious-based friendships may be enough to decrease the likelihood that alcohol or other substances will be used to regulate affect. However, it is possible that diet may not be impacted in the same manner because unhealthy eating may accompany religious-based coping. Prospective,

controlled research is needed to determine specific beneficial and harmful religious-based strategies that might be utilized by religious individuals.

Lastly, religion may influence health behaviors by crystallizing "self-labels" or causing a shift in identity. In a review of 14 studies related to smoking cessation, reduction of cardiovascular risks, and weight management, Kearney and O'Sullivan (2003) noted that the key moments in beginning behavior consisted of a critical reappraisal of self and situation. If subsequent attempts at changing behavior were successful in moving a person towards a "new identity", subsequent behavior changes were likely. West (2005) has criticized models of health behavior such as the Transtheoretical Model (Prochaska & DiClemente, 1983) because some motivational forces that act on habitual behaviors are not considered. He suggests that a self-label (nonsmoker vs. smoker) may in and of itself have value to an individual. In this context, religious labels (such as "born again", "saved", etc.) may be closely tied with certain health behaviors (non-drinker and nonsmoker). Consequently, health behaviors may function in tandem with religion in the formation and maintenance of identity.

The Need for Assessment Measures

Because religiosity can potentially impact behavior in a variety of ways, simply observing the relationship between religiousness and health practices will unlikely lead to an understanding of the mechanisms by which religion can influence health behaviors. Instead, assessing individuals' beliefs about the manner in which specific religious factors relate to health behaviors may prove to be more useful. Despite the recognition that providence is an aspect of religion that may or may not be reliably measured through scientific means, investigators can explore many aspects of organized religion related to cost/benefit analysis, perceived value, social influences, and identity formation. Therefore, it is logical to conceptualize religiosity in a behavioral paradigm associated with these contextual factors.

Psychological assessment has been defined in various ways. However, it is generally recognized as a systematic evaluation of behavior and/or behavioral correlates of an individual or group of people. Assessment may include motor, verbal, cognitive, and physiological responses (Haynes & O'Brien,

2000). The information obtained from these sources becomes a crucial component in understanding the complexities of behavior. The results of psychological assessments often lead clinicians and researchers to infer the causes or contributing factors of the behavior and, depending on the desirability of the behaviors, try to alter or maintain them. Measurement is a core component of psychological assessment. The more accurately and reliably aspects of behavior can be quantified, the greater the potential to correctly predict behavior. Measurement instruments provide evidence in which to perform functional analyses of behavior, and thus increase the likelihood of providing effective interventions.

There is no shortage of assessment instruments pertaining to the various domains of religiosity (Hill & Wood, 1999). However, a paucity of measures exists to elucidate the mechanisms by which religion may impact health behaviors. Francis and Greer (1992) developed the Christian Moral Values Scale, which included the degree to which adolescents from Northern Ireland believed drinking and drunkenness were wrong. Alcohol use was part of a moral construct including behaviors such as stealing, suicide, and abortion. However, the scale was not designed to distinguish between various aspects of religion (doctrine, personal beliefs, socialization, etc.) that may impact these beliefs. Another scale, the Duke University Religion Index (DUREL; Koenig, Meador, & Parkerson 1997), measures intrinsic religiosity, religious experience, and religious behaviors (praying, Bible reading, etc.) Although these measurement tools often include questions regarding the degree to which religion impacts "all areas of life", health behaviors are not commonly queried.

Because of this void in the literature, Hill and Pargament (2003) recommended the development of religious measures that are related to physical health. In addition, Hart et al. (2004) have suggested that there is a need to perform research that directly queries individuals about how their religious beliefs impact health behaviors. Whereas past research has focused on measuring religiosity and correlating these measures with health behaviors, the HARCS is a measurement tool that will allow investigators to understand specific ways in which religion may impact health behaviors. Items in the HARCS combine antecedents (religious beliefs, religious socialization, etc.) with health behaviors. The self-report

questions *directly* link religious factors to health behaviors. This approach is useful because certain aspects of religion may be important in promoting healthy habits whereas other aspects of religion may have no impact or may even encourage unhealthy behaviors. Without assessment tools to differentiate between the multiple religion-behavior relationships, theories regarding religion and health behavior will be subject to speculation rather than empiricism. In conclusion, the primary aim of the present investigation is to continue the development and validation of a measurement instrument that could be used in research investigating the mechanisms by which religiosity may affect alcohol consumption, eating, smoking, physical activity, and weight management. This measure, the HARCS, has undergone preliminary study, which is described in the next section.

Previous Investigation

Creel, Williamson, Copeland, & Businelle (2005) developed a 56-item, self-report scale which queried individuals about the relationship of their religious beliefs/practices with various health behaviors including: smoking cigarettes, abstaining from alcohol, drinking to the point of intoxication, healthy eating, overeating, physical activity, and weight management. Items of the scale were developed in response to a review of the extant literature on religion and health behaviors. Principles such as cognitive dissonance, peer influence, guilt, and intrinsic versus extrinsic religiosity were considered when writing the items. Items were created to assess religious congruency (beliefs or doctrinal practices supporting healthy behaviors) as related to the health behaviors. Eight questions were developed for each of the seven health behaviors, for a total of 56 items in the original scale. Table 1 illustrates the religious variables and health behaviors that were combined in developing the 56 questions.

The response to each question was based on a 5-point Likert Scale that ranged from Strongly Disagree (0) to Strongly Agree (4). To establish content validity, three clinical health psychologists and one doctoral-level public health specialist were consulted. These individuals provided feedback on how well questions sampled the domain related to religion and its relationship to health behaviors. In order to ensure questions were written in a manner that would be racially sensitive and applicable to religious

practices of African Americans and Caucasians, two of the four reviewers were African American and two were Caucasian.

Table 1. Template for Question Development of the HARCS

Religious Variables	Health Behaviors
<u>Personal Religious Beliefs</u> 1) Influence My personal religious beliefs influence whether or not I… 2) Morality (right/wrong) According to my personal religious beliefs, it is wrong to… 3) Judgment of others' commitment In my opinion, people who… are not being committed to God 4) Peer Influence If I…I would feel comfortable doing so around most of the people at my church. 5) Importance An important part of my religious beliefs is… <u>Church Doctrine/Functions</u> 6) Influence The social functions at my church influence me to… 7) Position (right/wrong) My churches discourages… 8) Importance An important part of the teachings at my church is…	1) Smoke 2) Drink Alcohol 3) Get Drunk 4) Eat (Un)healthy 5) Overeat 6) Physically (In)active 7) Overweight

Note. Each of the religious variables (1-8) were combined with each of the health behaviors (1-7) for a total of 56 questions in the original questionnaire. The wording of the religious variables in this table does not reflect the exact wording of each item in the questionnaire.

In addition to the 56-item scale, the previous study included a 12-item, self-report Religiousness Scale (Strayhorn, Weidman, & Larson, 1990) as well as 12-item health behaviors questionnaire designed to obtain information about the frequency and/or magnitude of the health behaviors of interest. Demographic data such as race, age, gender, education level, self-reported height/weight, and religious affiliation were also collected. Participants for the study were recruited primarily from church congregations in southeast Louisiana. Volunteers (N=310) who were at least 18 years of age and attended church services at least once per month participated in the study. Table 2 summarizes the demographic data.

Table 2. Participant Demographics - Pilot Study

Variable		Variable	
Gender (% of group)		Race (% of group)	
Male	34.1	White	89.4
Female	65.9	African American	8.7
Age (% of group)		Other	1.9
18-29	8.0	Religious Denomination (% of group)	
30-39	14.5	Catholic	2.6
40-49	22.2	Baptist	52.1
50-59	20.6	Methodist	35.7
60-69	16.7	Nondenominational	6.8
70+	17.0	Other	2.9
not reported	1.0		

Results of the Pilot Study

Exploratory principal component analysis (PCA) was conducted using the original 56-item questionnaire. Because significant correlations between some of the health behaviors were expected, an oblique rotation (PROMAX) of the correlation matrices was used. The Kaiser-Meyer-Olkin measure of sampling adequacy and the Bartlett's test of sphericity indicated that the data were appropriate for PCA.

The Kaiser-Meyer-Olkin index was .91 and the Bartlett's test was highly significant ($p < .001$). The Scree plot indicated a solution of 5 to 8 factors, all with eigenvalues >1.00. The most clearly interpretable factor analytic solution consisted of 7 factors (see Table 3). Items from the original questionnaire were retained if they had a factor loading of .55 or higher on a factor, and if the factor loading was at least .15 higher than loadings on other factors.

Internal Consistency

After removing items based on factor loadings, an item analysis for each scale was computed to determine if eliminating any items would increase the coefficient alpha of the subscales. No items were found that would decrease subscale reliability and subsequently 38 items were retained. The coefficient alpha for the 38-item Health and Religious Congruency Scale (HARCS) was .91, and this solution accounted for 58.8% of total item variance. The seven subscales (SS) were labeled as follows: SS1-General Religious Influence on Drinking/Smoking, SS2-Church Doctrine and Eating/Activity/Weight, SS3-Religious Commitment and Eating/Activity/Weight, SS4-Religious Connectedness to Eating/Activity/Weight, SS5- Church Social Functions and Eating/Weight, SS6- Church Social Functions and Smoking/Drinking, and SS7-Peer Influence on Smoking/Drinking. Average coefficient alpha for the 7 subscales was .75, and the range was .54 to .92.

Validity

Because the items in the HARCS combine components of religiosity with various health behaviors, one aspect of the validity of the HARCS can be evaluated by its correspondence with the Religiousness Scale and the Health Behaviors Questionnaire (HBQ). Prior to determining the relationship between the HARCS and HBQ, PCA with varimax rotation was computed for the HBQ. Four factors were identified with eigenvalues > 1.00. The Scree Plot also indicated a four-factor solution. Each item loaded on only one factor yielding the following four factors: alcohol consumption, smoking, eating/exercise, and overeating/inactivity. Table 4 illustrates the Pearson correlation coefficients between the HBQ factors (excluding smoking), HARCS, HARCS subscales, BMI, and the religiousness scale.

Table 3.

Factor loadings for the 38-item HARCS – Pilot Study

Factors and Items	Factor Loadings
General Religious Influence on Drinking/Smoking	
54. An important part of my religious beliefs is abstaining from drinking alcohol.	.84
8. An important part of the teachings at my church is abstaining from alcohol.	.78
2. My church takes a stand against drinking alcohol.	.77
28. According to my personal religious beliefs it is wrong for me to drink alcohol.	.75
20. My personal religious beliefs influence whether or not I drink alcohol.	.75
47. According to my personal religious beliefs it is wrong to get drunk.	.72
39. Not smoking is an important part of the teachings at my church.	.69
30. My personal religious beliefs influence whether or not I get drunk.	.69
45. My church discourages cigarette smoking.	.68
24. An important part of the teachings of my church is to abstain from drunkenness.	.68
52. In my opinion, a person who gets drunk is not being committed to God.	.66
19. Avoiding drinking too much alcohol is an important part of my personal religious beliefs.	.63
40. My church discourages drunkenness.	.60
Church Doctrine and Eating/Activity/Weight	
32. Maintaining a healthy weight is an important part of the teachings at my church.	.85
53. Making healthy food choices is an important part of the teachings at my church.	.84
38. My church takes a stand against eating an unhealthy diet.	.83
21. Being physically active is an important part of the teachings of my church.	.82
42. My church discourages being overweight.	.76
12. My church discourages overeating.	.70
18. My church takes a stand against living a physically inactive lifestyle.	.70
6. An important part of the teachings at my church is eating in moderation.	.69

Table 3 (cont).

Factors (coefficient alpha) and Items	Factor Loadings
Religious Commitment and Eating/Activity/Weight	
17. In my opinion people who eat unhealthy are not being committed to God.	.86
16. People who choose to be physically inactive are not being committed to God.	.85
29. I view overweight people as being less committed to God.	.74
4. People who eat until they are uncomfortably full are demonstrating a lack of commitment to God.	.67
Religious Connectedness to Eating/Activity/Weight	
31. My personal religious beliefs have nothing to do with whether or not I overeat.*	.73
25. My weight is not influenced by my personal religious beliefs.*	.73
3. My personal religious beliefs have no impact on my food choices.*	.70
10. My personal religious beliefs and my level of physical activity are unrelated.*	.69
Church Social Functions and Eating/Weight	
55. The social functions of my church influence me to overeat.*	.82
34. The social functions of my church influence me to eat unhealthy foods.*	.80
51. My church involvement makes it harder to maintain a healthy weight.*	.72
Church Social Functions and Smoking/Drinking	
56. The social functions of my church influence me to drink alcohol.*	.76
49. The social functions of my church influence me to smoke cigarettes.*	.74
46. The social functions of my church influence me to sometimes drink too much alcohol.*	.69
Peer Influence on Smoking/Drinking	
15. I would feel comfortable if my church friends witnessed me getting tipsy at a social function.*	.75
43. If I drank alcohol I would feel comfortable doing so around most of the people at my church.*	.74
9. If I were a smoker, I would feel comfortable smoking cigarettes around people who attend my church.*	.61

Note.* = reversed scored item

A high score on the HARCS total or a HARCS subscale indicates religiosity was positively associated with health behaviors (less smoking and drinking, more exercise, and eating healthy foods in healthy amounts). Smoking was not included in Table 4 because of non-significant values, most likely related to too few smokers in the sample (approximately 6.4% of the sample identified themselves as a "smoker" or "social smoker"; approximately half of these individuals reported that they were currently trying to quit smoking). HARCS total score and HARCS SS1 had significant correlations with frequency/amount of alcohol consumption. In addition, HARCS, HARCS SS1, HARCS SS2, HARCS SS3, and HARCS SS4 were significantly correlated with the religiousness scale.

Methodist vs. Baptist

Since most study participants identified their church denomination as Methodist or Baptist, these two denominations were compared using a one-way analysis of variance (ANOVA). ANOVA revealed higher religiosity scores among Baptists compared to Methodists (see Figure 1). Therefore, a multiple analysis of covariance (MANCOVA) was computed with religiousness scores as the covariate and denomination as the independent variable. Dependent variables included HARCS total score, HARCS subscales, health questions, and BMI. Figure 1 illustrates the comparisons of means for the Religiousness Scale scores as well as the adjusted means of the other dependent variables.

After controlling for religiosity, overall HARCS scores were significantly greater for Baptists compared to Methodists ($p<.001$). In addition, Baptists scored significantly higher than Methodists on smoking and drinking related subscales (SS1 and SS7) as well SS3, which is related to religious commitment and eating/activity/weight. On SS5 (Impact of Church Social Functions on Eating/Weight) Methodists scored higher than Baptists indicating that Baptists view church social functions as more deleterious to eating healthy and maintaining healthy body weight than did Methodists.

Age

Participants reported their age in 10-year increments. To compare age groups, the sample was split into two groups, under age 50 (n =136) and over age 50 (n = 167). MANOVA indicated that individuals

Table 4.

Correlation Coefficients Among HARCS, HARCS subscales, Religiousness Questionnaire, Health Questions, and BMI – Pilot Study

Variable	HARCS (TOTAL)	SS1 General D & S	SS2 Church Doctrine E/A/W	SS3 Religious Commitment E/A/W	SS4 Religion Connected E/A/W	SS5 Social Functions E &W	SS6 Social Functions D & S	SS7 Peer Influence D & S	Religion Scale (RS)	HQ 1 Drinking	HQ 2 Eating & Exercise	HQ 3 Overeat & Inactivity	BMI
HARCS	(.91)												
SS1	.88*	(.92)											
SS2	.75*	.49*	(.91)										
SS3	.65*	.44*	.56*	(.80)									
SS4	.57*	.37*	.36*	.42*	(.72)								
SS5	.01	-.17*	.02	-.07	-.05	(.71)							
SS6	.22*	.14	.02	-.06	.07	.18*	(.62)						
SS7	.35*	.24*	.12	.09	.06	-.08	.10	(.54)					
RS	.45*	.44*	.21*	.25*	.47*	-.14	.08	.14	(.85)				
HQ 1	-.39*	-.49*	-.14	-.19*	-.20*	-.10	-.02	-.14	-.30*	(.73)			
HQ 2	.06	-.02	.09	.17*	.21*	-.12	-.01	-.05	.17*	-.03	(.59)		
HQ 3	-.11	-.01	-.17*	-.11	-.15*	-.12	.04	-.04	-.09	.02	-.27*	(.76)	
BMI	-.14	-.12	-.11	-.11	-.08	.03	-.04	-.04	-.05	-.11	-.23*	.29*	_

Note. * = signficance at $p < .01$. HARCS= Health and Religious Congruency Scale, SS= Subscale, D= Drinking, S=Smoking, E=Eating, A=Physical Activity, W=Weight, BMI=Body Mass Index, HQ=Health Questions. Alpha coefficients are presented on the diagonal in parentheses.

over age 50 scored higher (M = 47.9, SD = 5.6) on the religiousness scale compared to the younger group (M= 46.3, SD = 7.2); F(1, 303) = 5.2; p <.05). A MANCOVA, controlling for religiosity, indicated that older individuals scored higher on SS3- Religious Commitment and Eating/Activity/Weight (M = 6.3, SD = 3.0) compared to individuals under the age of 50 (M = 5.3, SD = 3.0); F(1,303) = 7.3; p < .01). Older individuals also scored lower on the overeating/inactivity health questions (M = 8.1, SD = 2.5) compared to younger participants (M = 8.7, SD = 2.5); F(1,303) = 4.4; p < .05).

Discussion of Pilot Study Findings

The primary goal of the initial investigation was to develop a questionnaire that could be used to measure the congruency of religious beliefs and health behaviors. In a sample of primarily Baptists and Methodists, the 38-item HARCS was found to have seven subscales with good internal consistency. Each subscale included items pertaining to only one of two groups of behaviors (1- Drinking/Smoking, 2- Eating, Physical Activity, and Weight). Therefore, it appears that from a religious perspective, drinking and smoking (D/S) are differentiated from behaviors related to eating, physical activity, and weight control (E/A/W). Furthermore, when individuals are asked to view health behaviors from a religious context, perspectives on smoking and drinking are similar. Results of the initial investigation also suggest that individuals perceive eating, physical activity, and weight control similarly from a religious framework.

HARCS in Relation to Behavior

Negative correlations between scores on HARCS total score/HARCS SS1 and drinking behaviors suggest that religious congruency was associated with alcohol consumption. Correlations between E/A/W scales and eating/activity-related behaviors also supported the hypothesis that religious beliefs about eating and activity are related to those behaviors. However, religious congruency related to E/A/W accounted for only small amounts of variance in eating and exercise behaviors. In addition, E/A/W subscales were not related to BMI, suggesting that these beliefs did not correspond to behavioral

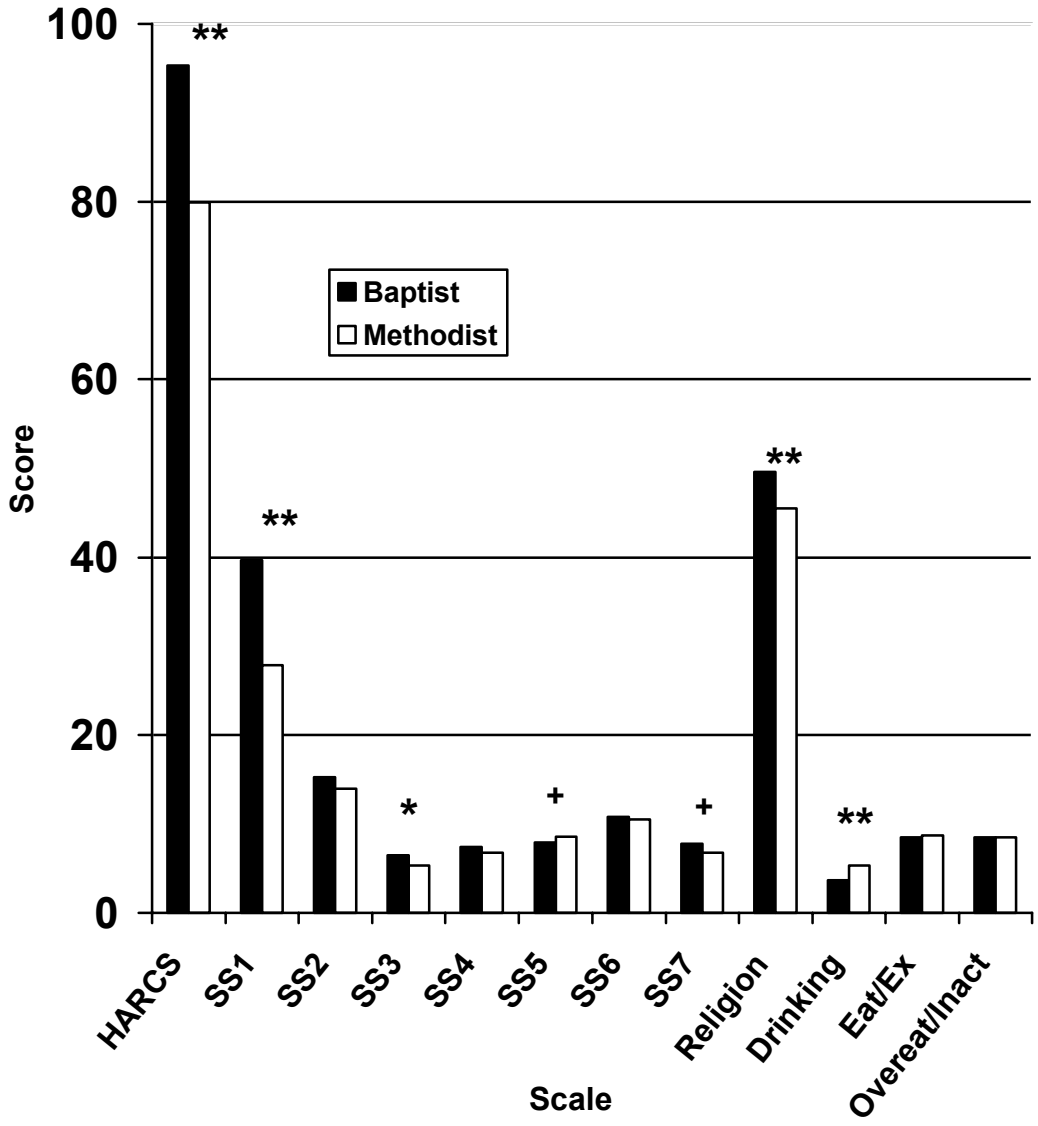

Figure 1. Pilot Study comparison between Methodists and Baptists on HARCS scores, Religiousness scores, and Health Behavior scores (drinking, eating and exercise = Eat/Ex; overeating and inactivity = Overeat/Inact). SS1-General Religious Influence for Drinking and Smoking, SS2-Church Doctrine and Eating/Activity/Weight, SS3-Religious Commitment and Eating/Activity/Weight, SS4-Religious Connectedness to Eating/Activity/Weight, SS5- Impact of Church Social Functions on Eating and Weight, SS6-Impact of Church Social Functions on Smoking and Drinking, and SS7-Peer Influence on Smoking and Drinking. ** = $p < .001$; * = $p < .01$; + = $p < .05$.

outcomes such as body weight. Because this pilot study had so few smokers, the correlation between religious beliefs and smoking behaviors could not be adequately assessed. However, the observation that a highly religious sample yielded very low smoking rates indirectly supports the idea that religious attitudes, beliefs, and doctrines are negatively associated with smoking behaviors. Therefore, in our sample, religious-based health factors accounted for a significant portion of variance in health behaviors, but this effect was most clearly detected for drinking alcohol.

Religiousness in Relation to Health Behaviors and HARCS Scores

The negative correlation between alcohol-related health questions and religiousness scores, and the low smoking rate within our religious sample, support previous data showing that religiousness is inversely related to alcohol use and smoking. Specific to the HARCS, religiousness was correlated with total HARCS score, the General Drinking and Smoking subscale, and two E/A/W subscales (Religious Commitment and Religious Connectedness). These low to moderate correlations support the notion that the HARCS is not a religiosity measure but instead is a construct which requires a degree of religiosity to be meaningful.

Religious Affiliation

Consistent with the extant literature (Koenig 1994), conservative Protestants (Baptists) scored higher than more liberal Protestants (Methodists) on HARCS scales related to drinking and smoking. These differences were significant even when religiosity was statistically controlled, suggesting that religious denomination, independent of religiosity, is an important factor in the association between religion and drinking/smoking. The only smoking/drinking subscale that was not significantly different between Methodists and Baptists was SS6-Church Social Functions and Smoking/Drinking. Because of the wording of the questions in SS6, this finding is not surprising. Although Methodists and Baptists may view drinking and smoking somewhat differently, it is doubtful that alcohol and tobacco are commonly encouraged at church-sponsored events. However, it is feasible that more liberal Protestant groups or Catholics may respond differently to this set of questions. These groups often include alcohol as part of

worship (communion); therefore serving alcohol at church-related social functions may be more acceptable.

Our results suggest that the association between Baptist/Methodist denomination and eating, physical activity, and body weight is multifaceted. When controlling for religiosity, we found differences between Methodists and Baptists on two E/A/W subscales. On SS3-Religious Commitment and E/A/W, Baptists scored higher than Methodists suggesting that Baptists more strongly endorse the belief that unhealthy eating/activity are indicative of a lower commitment to God. This finding is interesting in light of the fact that Baptists scored lower on SS5-Church Social Functions and E/W, meaning that Baptists view church functions as an environment more conducive to unhealthy eating and weight gain than do Methodists.

It is possible that personal religious beliefs about eating, and church socialization may have somewhat opposing influences for some Baptists. They may believe that unhealthy eating is indicative of less commitment to God, while at the same time church social functions promote poor food choices. According to dissonance theory (Festinger, 1957), individuals experiencing these types of opposing cognitive-behavioral influences are motivated to change thoughts or behaviors in order to restore consistency. Therefore, it is plausible that a high degree of unhealthy eating associated with the Baptist denomination could serve to weaken or override any beliefs about the morality of these behaviors. In addition, these environmental influences (the abundance of unhealthy food choices at social functions) may discourage Baptists from codifying healthy eating habits into their personal doctrine. Although future research is needed to test this logic and generalize our findings, some research supports the idea that conservative Protestant affiliation may encourage unhealthy eating habits leading to higher body weights. (Kim, Sobal, & Wethington 2003; Ferraro, 1998).

Age Effects

Several significant findings were related to the age of participants. Older adults scored higher on the religiousness scale than younger adults. Controlling for religiosity, older adults scored higher on SS3-

Religious Commitment and E/A/W. In addition, older individuals reported less overeating and inactivity compared to younger individuals. Although untested in this study, it is possible that as individuals age and experience more health problems, the relationship between behavior and health outcomes become more salient. It is conceivable that as this process occurs, beliefs about diet and exercise are more easily integrated into a religious belief system. Future research should test this hypothesis, examining the possibility that religiously-based social support may mediate the relationship between age and religious beliefs about health behaviors (Koenig, George, & Titus 2004).

Study Considerations and Limitations

Because it was theorized that the HARCS would eventually be most useful in religious groups, we recruited individuals who reported attending church at least monthly. Not only did the participants meet this criterion but our data indicate that they were overall a *highly* religious sample. For example, most participants were recruited at actual church services and over 95% of the participants reported attending church service almost weekly or more. In addition, in response to the question "How religious would you say you are?" over 88% responded "pretty much" or "very much." By recruiting the majority of individuals from church services, our sample was not as religiously heterogeneous as the general population. One advantage of this sampling strategy was that this group most likely represents the type of individuals that are likely to be studied in future research examining the effects of religiosity on health. However, the homogeneity of the group most likely restricted the range of scores on the religiousness questionnaire compared to what might be found in a less religious sample. The mathematical computation of correlation coefficients requires that as a sample becomes more homogeneous, the correlation coefficient decreases (Hinkle, Wiersma, & Jurs 1998). Therefore, within a more religiously diverse population, the correlations between religiosity and the HARCS (especially on the scales consisting of drinking and smoking) may be higher than what we observed. On the other hand, it is possible that individuals who are not highly religious will show low variability of responses on the HARCS because religious beliefs and practices will have almost no congruency to health behaviors. In

addition, our data indicated that being Baptist, as opposed to Methodist, was associated with higher HARCS SS scores related to drinking/smoking. Therefore it is plausible that different denominations, other than Methodist and Baptist, may have an influence on HARCS responses. It is possible that with a more diverse sample (more variability of religiosity and denominations), not only would scores within the factors vary, but the factor structure of the HARCS could also be different.

The low smoking rates found in the study may have been a result of recruiting predominately a highly religious sample. It is possible that due to this factor, smoking items were answered differently than they would have been in a sample containing more smokers. Due to this possibility, several questions related to smoking were added to the 38-question HARCS (see Appendix A) in the follow-up study described in the next section.

Another potential limitation of the initial study is the finding that none of the subscales contain a combination of positively and negatively scored items. Therefore, it is possible that the sentence structure of the items impacted item responses. However, the factor structure was not characterized by overlap of smoking/drinking items with eating/activity/weight items, suggesting that the meaning of the items was not negated by word organization. HARCS questions combine beliefs or church doctrine with health behaviors. Because the questions have two components, wording questions similarly may be optimal to ensure that the sentence structure does not obscure the meaning. For example, consider the statement, "according to my personal religious beliefs I should eat healthy". An alternate or reversed scored item may be something like "according to my religious beliefs I should eat unhealthy" or "my religious beliefs have nothing to do with whether or not I eat healthy". Because of the two parts of the statement (religious beliefs and the behavior associated with it) it is unlikely that the first statement would be clearly perceived as the opposite of the two examples that follow.

Aims of the Current Study

The main objective of the current investigation was to determine if the factor structure of the 38-item HARCS was stable among a more religiously diverse sample of individuals. Confirmatory factor

analyses revealed the goodness-of-fit of the factor structure of the initial investigation to data gathered in the present study. Additional aims of this investigation included establishing construct validity and reliability of the HARCS and its subscales. Regression analysis was used to establish the relationship of the HARCS with religiosity, health behaviors, age, and gender. Test-retest reliability determined temporal stability of the HARCS. Specific primary aims of the study are listed below.

Primary Aim 1: Confirmatory factor analyses will be used to test the stability of the factor structure found in the pilot study, using a new, independent sample.

Primary Aim 2: Hierarchical regression modeling will test the hypothesis that variability of the HARCS is related to the additive components of religiosity and health behaviors.

Primary Aim 3: The final version of the HARCS will have acceptable test-retest reliability.

METHOD

Participants

A primary recruitment objective of the study was to sample a more religiously diverse participant pool compared to the pilot study. This objective was accomplished by recruiting individuals from a wider range of church denominations as well as from secular environments. Participant demographics are illustrated in Table 5 which shows that 5 different denominations, each represented 5% or more of the sample. A significant portion of the sample identified their church as non-denominational. This outcome was primarily due to recruiting from one church without a specific religious affiliation. Based on religious classification literature (Olson & Perl, 2001; Smith, 1990) this church was categorized as conservative. According to the classifications listed in Appendix B., 35.8% of the participants were affiliated with non-conservative religious denominations, whereas 64.2% were affiliated with conservative denominations.

Table 5. Participant Demographics

Variable		Variable	
Gender	(% of group)	Religious Denomination	(% of group)
Male	28.4	African Methodist Episcopal	.5
Female	71.6	Baptist	14.0
		Catholic	21.9
Age (% of group)		Church of Christ	2.3
18-29	31.6	Church of God	1.9
30-39	18.2	Disciples of Christ	19.5
40-49	19.0	Judaism	.5
50-59	17.2	Lutheran	6.0
60-69	5.2	Methodist	5.1
70+	8.8	Mormon	.9
		Nazarene	1.9
Race (% of group)		Nondenominational	16.7
White	90.2	Pentecostal/Charismatic	1.9
African American	5.6	Presbyterian	1.9
Latino	2.8	Unknown/Other	5.1
Other	1.4		

Among the 218 individuals who completed informed consent forms, 3 were not included in the final data because of incomplete questionnaire forms. Sixty of the remaining participants (N=215) were undergraduate students at Louisiana State University, whereas the other participants were community residents from South Carolina and Indiana. Seventy-seven participants received re-test packets; 69 were completed and returned. Two participant's retest data were not included in the analyses because their original questionnaire was incomplete, leaving a total of 67 participants for test-retest analysis. Thirty-seven of the retest participants were students. Undergraduate students received course credit for their participation but other participants, primarily recruited from church and medical settings, were not compensated for their involvement in the study. All participants were at least 18 years of age and reported attending church at least 6 times per year. There were no other eligibility requirements for the study.

Questionnaire Packet

Each participant signed informed consent to participate in the investigation. The initial questionnaire packets were provided to participants in person. Most participants completed the packet in the setting in which it was given (waiting room, church meeting room, etc.). In the demographic section of the packet, participants reported the date of the administration and contact information in order to facilitate obtaining re-test data. In addition, participants reported their current church denomination, gender, age, weight, height, education, and ethnicity. The remainder of the packet included 17 health-behavior questions, a validated religiousness scale, and the 38-item HARCS with two additional smoking questions.

Health Behaviors Questionnaire (HBQ)

The HBQ (table 6) includes questions regarding smoking, drinking alcohol, diet and overeating, exercise, and weight. Many of the questions in this section are identical or slight modifications to the questions in the pilot study. Table 6 indicates which questions are new, modified, or identical to those in the pilot study.

Table 6. Health Behavior Questionnaire

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1 (N). Have you ever smoked a cigarette? Yes No

2 (N). Have you smoked 100 or more cigarettes in your lifetime? Yes No

3 (I). On average, how many cigarettes do you smoke per day? 0 1-5 6-10 10-20 20+

4 (M). In relationship to your smoking habits, how would you describe yourself?

Nonsmoker Daily smoker not trying to quit Smoker Currently Trying to Quit

Frequent Social Smoker Infrequent Social Smoker

5 (I). On average, how many servings of vegetables do you eat per day? (1 svg = ½ cup, do not include French fries in your estimation) Less than 1 1-2 2-3 3-4 More than 4

6 (I). On average, how many serving of fruit do you eat per day? (1 serving = 1 piece of fruit, ½ cup of unsweetened fruit juice, or ½ cup of pieces of fruit)

Less than 1 1-2 2-3 3-4 More than 4

7 (M). On average, how often do you eat fatty meats such as fried chicken, hamburger, fried fish, bologna, bacon, sausage, ribeye steak, chicken wings, ribs, etc.?

More than once per day About once per day 4-5 times per week

2-3 times per week Once per week or less

8 (N). How would you describe your diet (in terms of how healthy it is)?

Excellent Very good Good Fair Poor

9 (I). How often do you eat until you are uncomfortably full?

Several times per year or less Once every 1-2 months Once every 1-2 weeks Several times per week Almost daily or more

10 (I). How often do you eat more than you should?

Several times per year or less Once every 1-2 months Once every 1-2 weeks

Several times per week Almost daily or more

Table 6 (cont.).

11 (N). Are you currently involved in a weight management program/counseling (such as Weight Watchers, Jenny Craig, LA Weight Loss, a university based program or study, or regular counseling with a dietitian)? Yes No
12 (N). How would you describe your current weight? More than 100 pounds overweight 50-100 pounds overweight 25-50 pounds overweight Normal weight Underweight
13 (I). How would you best describe your drinking habits? I don't drink alcohol at all I drink alcohol less than once per month I drink alcohol once to several times per month I drink alcohol about once per week I drink alcohol several times per week or more
14 (I). How many times in the past year have you had a headache, felt nauseated or been unusually sluggish because of drinking alcohol? None 1-2 times 3-6 times 7-10 times More than 10 times
15 (M). During the past 30 days, on how many days did you have IF MALE – 5 or more drinks within a 2-3 hour period of time? IF FEMALE – 4 or more drinks within a 2-3 hour period of time? None 1-3 times 4-6 times 7-9 times 10 or more times
16 (I). How often do you exercise? Less than once per week About once per week 2-3 times per week 4-5 times per week 6-7 times per week
17 (I). Not including structured exercise, how physically active would you say that you are? Very inactive Inactive Somewhat physically active Physically active Very physically active

Note. N = new question, not included in pilot study; M = modified question from pilot study; I = identical question to that asked in pilot study

The Religiousness Scale

The 12-item Religiousness Scale was used to measure participants' level of religiosity (Strayhorn, Weidman, & Larson, 1990). This scale is an adaptation of a scale developed by Kauffman (1979) and has been shown to have satisfactory internal consistency and test-retest reliability (Strayhorn et al., 1990). Strayhorn and colleagues studied mothers of children in the Head Start program and found that scores on the Religiousness Scale differentiated mothers who planned to raise their children in a specific religion from mothers who were not planning to raise their children in a religious environment. This scale was selected because of its ecumenical properties. Without reference to exclusive denominational practices, the scale evaluates common church practices (attendance, monetary giving, service) and assesses beliefs and practices related to having a personal relationship with God (praying for strength and guidance, experiencing God's approval/disapproval, and awareness of a religious purpose). Table 7 lists the questions that make up the Religiousness Scale.

Table 7. The Religiousness Scale

1.	How religious would you say you are? Not at all Not very much Somewhat Pretty much Very Much
2.	How often do you study the Bible or other religious literature privately? Never Seldom Occassionaly Frequently (at least once a week but not daily) Daily
3.	Other than at mealtime, how often, on the average, do you pray to God privately? Several times per day Daily Occassionally Seldom Never
4.	When you are tempted to do something wrong, how often do you ask God for strength to do right? Very often Often Sometimes Seldom Never
5.	When you have decisions to make, in your everyday life, how often do you ask yourself what God would want you to do, or ask God for help in making the decision? Very often Often Sometimes Seldom Never

Table 7 (cont.).

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6. On the average, how often have you attended religious worship services (i.e. Sunday morning, evening, and/or other days) during the last year?

   Never A few times per year Once or twice a month

   Weekly or almost weekly More than once per week

7. How much of your income do you donate, per year, to a church or a religious organization?

   None A very small donation, relative to income

   A small donation, relative to my income A medium donation relative to my income

   A large donation, relative to my income

8. How often do you serve a church or other religious organization in Sunday school teaching, church project leadership, or other responsibilities?

   Never A few times a year Once or twice a month

   Weekly or almost weekly More than once a week

9. How would you describe the nature of your relationship to God?

   No relationship, or do not use the concept of God Distant relationship

   Between distant and close relationship Close relationship Very close relationship

10. How often do you experience or feel God's approval for some good act you have done?

    Never Seldom Occassionally Often Very often

11. How often do you experience God's disapproval for some undesirable act you have done?

    Never Seldom Occassionally Often Very often

12. To what extent are you conscious of some religious goal or purpose in life which serves to give direction to your life?

    Not at all To a small extent To a moderate extent

    To a large extent To a very large extent

HARCS and HARCS Retest

The 38-item HARCS (Table 3) and the two additional questions listed in Appendix A were administered. Items were presented in the order found in the original 56-item questionnaire used in the pilot study. Some of the undergraduate student participants were asked to complete a HARCS retest questionnaire. Students were given the initial questionnaire and then scheduled to return in 1-2 weeks to complete the retest. Individuals from several church congregations were also asked to complete retest questionnaires. Upon completing their initial questionnaire, they were provided a retest packet and a stamped, return envelope and asked to complete the form in 1-2 weeks. All analyzed retest packets were completed within 4 weeks of the initial questionnaire.

RESULTS

Statistical Procedures and Missing Data

Overall, questionnaire packets were completed thoroughly (less than .3% missing data). Missing questionnaire data were replaced using the mean of other participants for that question. An alpha level .05 was used for all statistical analyses. Principal Component Analyses (PCA) and Confirmatory Factor Analyses (CFA) were conducted using Statistical Analysis Software (SAS version 8.2 SAS Institute Inc., Cary, NC). All other statistics were conducted using SPSS Version 15.

CFA of the 38-item HARCS

To test whether the factor structure of the 38-item HARCS was stable in the current sample of participants, CFA was conducted. If covariance among the variables is consistent with the hypothesized factor structure, CFA can reveal an adequate fit of the data set to the hypothesized model. As Marsh, Hau, & Wen (2004) have discussed, there are no "golden rules" to determining goodness of fit (GOF). Although GOF indices provide guidance in interpretation, rigid cut-offs are considered inappropriate, leading to both type I and type II errors. Typically, several fit indices are used to determine overall fit of a model. In this study, Bentler's Comparative Fit Index (CFI) and the root mean square error of approximation (RMSEA) were primary indicators of model fit. These indices are commonly reported in scale development literature (White, Whisenhut, Williamson, Greenway, & Netemeyer, 2002; Pargament, Koenig, Perez, 2000; Reas, Whisenhut, Netemeyer, & Williamson, 2002). Other indices often yield similar results, although several are susceptible to sample size bias (Bentler, 1990). A CFI of .90 or greater generally reflects an acceptable level of fit. A RMSEA of .05 is generally indicative of a close fit, although values up to .08 represent reasonable errors of approximation (Joreskog & Sorbom, 1993).

Initially CFA tested whether the proposed model derived from the pilot study fit the current data. Fit statistics for this model were unacceptable (CFI = .78, RMSEA = .09). Modification indices did not reveal theoretically sound modifications nor did they improve fit indices to an acceptable level. Further examination of the data showed that the 3 items contained in subscale 6 of the 38-item HARCS had very

little variance (kurtosis and skewness values were high and exceeded the values of other items). These three items were related to church social functions leading to increased drinking and smoking. Data showed that even in a less religiously conservative sample, church social functions are not antecedents to drinking alcohol or smoking cigarettes. Therefore, these items were eliminated from the scale. Eliminating these items did not improve the fit of the model substantially; new fit indices were CFI = .84, RMSEA = .08.

PCA of Current Sample

The findings of the CFA suggested that the original factor structure was not sufficiently stable to conduct further analyses based upon the original factor structure of the HARCS. The lack of stability may have been caused by the lack of religious diversity among the participants in the pilot study (from which the initial factor structure was derived). Therefore PCA was performed on the current sample, a more religiously diverse group of individuals. Exploratory principal component analysis (PCA) was conducted using 37 items (three items were removed from the 38-item HARCS; 2 smoking items listed in Appendix A were included). Because significant correlations between some of the health behaviors were expected, an oblique rotation (PROMAX) was used. Using the Scree plot and eigenvalues > 1.00 as criteria, solutions ranging from 4 to 8 factors were considered. The most clearly interpretable factor analytic solution had 6 factors containing 32 items. Items were retained if they had a loading of .50 and only loaded on a single factor.

The resultant factor structure was quite similar to the factor structure found in the pilot study. However, Factor 1 (General Religious Influence on Drinking/Smoking was reduced in size (eliminating 4 items and adding 2 items). Factor 2 was reduced by 1 item. The results of PCA resulted in eliminating 5 questions related to denominational stands regarding health behaviors. This pattern of findings suggests that the pilot study sample may not have been representative of a more diverse religious population with regard to these questions. Overall, this factor structure showed good internal consistency. Cronbach's alpha for the six scales were as follows: General religious influence on drinking/smoking = .93, Church

doctrine and eating/activity/weight = .91, Religious commitment and eating/activity/weight = .83, Religious connectedness to eating/activity/weight = .75, Church social functions and eating/weight = .64, and Peer influence on smoking/drinking = .68.

CFA Combining Pilot Data with Current Data

In order to determine if this newly formed factor structure was stable, CFA was conducted combining current data with that from the pilot study. Combining the data assured that sample size was adequate. Although typical cross-validation studies perform CFA solely on new data collected independently of the original study, using the same data for PCA and CFA is an acceptable practice (Van Prooijen & Van Der Kloot, 2001; Anton, 2007). As Van Prooijen & Van Der Kloot have discussed, it is common that CFA will not confirm exploratory factor analysis even on the same sample. However, confirmation using the same sample helps rule out methodological explanations for a lack of fit. Results of CFA, combining pilot study data and current data (N=525), yielded an acceptable fit. The RMSEA was .06 and Bentler's CFI was .90.

Test-Retest Reliability

In order to determine the temporal stability of the HARCS scale and subscales, data from the first and second administration of the HARCS were used to calculate Pearson Product-moment correlation coefficients. Desirable stability coefficients generally range from .70 to 1.0 but the length of time between measures, the theorized construct stability, and the degree to which the construct is relevant to all study participants should be considered when deeming a measure as stable from one time point to another. Test-retest reliability coefficients were within acceptable ranges for the HARCS total scale and 4 of the 6 subscales: HARCS total = .85, General religious influence on smoking/drinking = .92, Church doctrine and eating/activity/weight = .71, religious commitment and eating/activity/weight = .74, and Church social functions and eating/weight = .70. Peer influence on smoking and drinking and Religious connectedness to eating/activity/weight had reliability coefficients that were below generally accepted

ranges (.46 and .58, respectively). Based upon these low test-retest correlations, these two scales were eliminated from the HARCS, leaving a 25-item scale consisting of 4 subscales (see Table 8).

Table 8. Factor Loadings for the 25-item HARCS

Factors (coefficient alpha) and Items	Factor Loadings
General Religious Influence on Drinking/Smoking	
22. My personal religious beliefs influence whether or not I get drunk.	.94
15. Avoiding drinking too much alcohol is an important part of my personal religious beliefs.	.90
33. According to my personal religious beliefs it is wrong to get drunk.	.86
16. My personal religious beliefs influence whether or not I drink alcohol.	.84
38. An important part of my religious beliefs is abstaining from drinking alcohol.	.67
18. An important part of the teachings of my church is to abstain from drunkenness.	.65
36. In my opinion, a person who gets drunk is not being committed to God.	.64
40. My church discourages drunkenness.	.63
20. According to my personal religious beliefs it is wrong for me to drink alcohol.	.62
1. My personal religious beliefs influence whether or not I smoke cigarettes	.62
5. According to my personal religious beliefs, it is wrong to smoke cigarettes	.62
Church Doctrine and Eating/Activity/Weight	
24. Maintaining a healthy weight is an important part of the teachings at my church.	.87
14. My church takes a stand against living a physically inactive lifestyle.	.86
37. Making healthy food choices is an important part of the teachings at my church.	.84
17. Being physically active is an important part of the teachings of my church.	.83
26. My church takes a stand against eating an unhealthy diet.	.79
6. An important part of the teachings at my church is eating in moderation.	.75
10. My church discourages overeating.	.70

Table 8 (cont.).

Factors (coefficient alpha) and Items	Factor Loadings
Religious Commitment and Eating/Activity/Weight	
13. In my opinion people who eat unhealthy are not being committed to God.	.78
12. People who choose to be physically inactive are not being committed to God.	.80
21. I view overweight people as being less committed to God.	.77
4. People who eat until they are uncomfortably full are demonstrating a lack of commitment to God.	.55
Church Social Functions and Eating/Weight	
39. The social functions of my church influence me to overeat.*	.80
25. The social functions of my church influence me to eat unhealthy foods.*	.81
35. My church involvement makes it harder to maintain a healthy weight.*	.69

Note.* = reversed scored item

Correlation Matrix

Table 9 shows the correlations among the HARCS scales, age, health behaviors, religious variables, and BMI. Subscales 1-3 are scored in a manner that higher scores indicate that religion has a positive impact on health behaviors. Items in subscale 4 query to what degree individuals agree that their church involvement leads to *unhealthy* dietary practices/weight management ("the social functions of my church influence me to overeat"). Therefore these items are reverse scored so that higher scores reflect a *less negative* influence of religion on eating/weight management. Considering the HARCS total score, a higher score means a person's religious beliefs/involvement are health promoting (less drinking/smoking, healthier eating, more exercise, less overeating, and lower weight classification). The higher the Religiousness Scale score the more religious a person is; the higher the score on the religious ranking the more conservative the person considers themselves in their religious beliefs.

Of note is the positive correlation between each of the subscales, with the exception of subscale 4. Subscale 4 was negatively correlated with subscale 1 but had non-significant correlations with the other

subscales. This finding suggests that subscale 4 is a distinct scale, measuring a construct that is unique from the other subscales. Religion was also positively correlated with all subscales except subscale 4. Religion was positively correlated with the drinking/smoking questions but was not significantly correlated with the other health behaviors. Age was positively correlated with religious variables, drinking/smoking questions, and all HARCS subscales except subscale 4. Age was negatively associated with questions regarding eating, exercise, and weight categorization. Because many of the variables were correlated, hierarchical regression analyses were utilized to determine which factors accounted for variance in the HARCS scales.

Comparison of Conservative vs. Non-Conservative Denominations

In the pilot study, Baptists were compared to Methodists relative to HARCS total scores, subscale scores, and health behaviors (Figure 1). In order to make a similar comparison with the current data, individuals from non-conservative denominations were compared to those from conservative denominations (based on the classification in Appendix B). A one-way analysis of variance (ANOVA) revealed higher religiosity scores among conservatives compared to those who attended conservative churches (see Figure 2). Because of these differences in religiousness, a multiple analysis of covariance (MANCOVA) was computed controlling for religiousness scores. Church denomination was entered as the independent variable whereas HARCS total score, HARCS subscales, and health questions were entered as dependent variables. Figure 2 illustrates that even when controlling for religiousness, conservative individuals score higher on the HARCS and subscales 1-3. In addition, conservatives scored lower on drinking/smoking questions than non-conservatives.

Validity Tests

The HARCS is a novel measure that was developed based on the notion that religious beliefs and religious-based social factors may influence health behaviors. Therefore, tests of HARCS validity should consider religiousness, health behaviors, and their interaction. It was expected that religiousness and

Table 9.

Observed Correlation between Total HARCS, HARCS Subscales, Religion Scale, Age, BMI, and Health Questions

Variable	HARCS (TOTAL)	SS1 General D & S	SS2 Church Doctrine E/A/W	SS3 Religious Commit. E/A/W	SS4 Social Functions E & W	Age	BMI	Religion Scale (RS)	Religious Ranking (RR)	HQ 1 Drinking & Smoking
SS1	.90**									
SS2	.75**	.45**								
SS3	.71**	.51**	.54**							
SS4	-.05	-.20**	-.08	-.13						
Age	.40**	.40**	.26**	.23**	-.05					
BMI	.18**	.23**	.14*	-.01	-.15*	.29**				
RS	.47**	.52**	.25**	.24**	-.05	.50**	.12			
RR	.45**	.51**	.15*	.19**	.03	.22**	.04	.45**		
HQ 1	.35**	.43**	.12	.15*	-.09	.50**	.32**	.40**	.35**	
HQ 2	-.08	-.11	-.05	.02	.07	-.17*	-.62**	.02	.06	-.11

Note. ** = significance at $p < .01$, * = significance at $p < .05$, HARCS = Health and Religious Congruency Scale, SS = Subscale, BMI= Body Mass Index, HQ = Health Questions, HQ2 = Health Questions related to eating, physical activity, and weight.

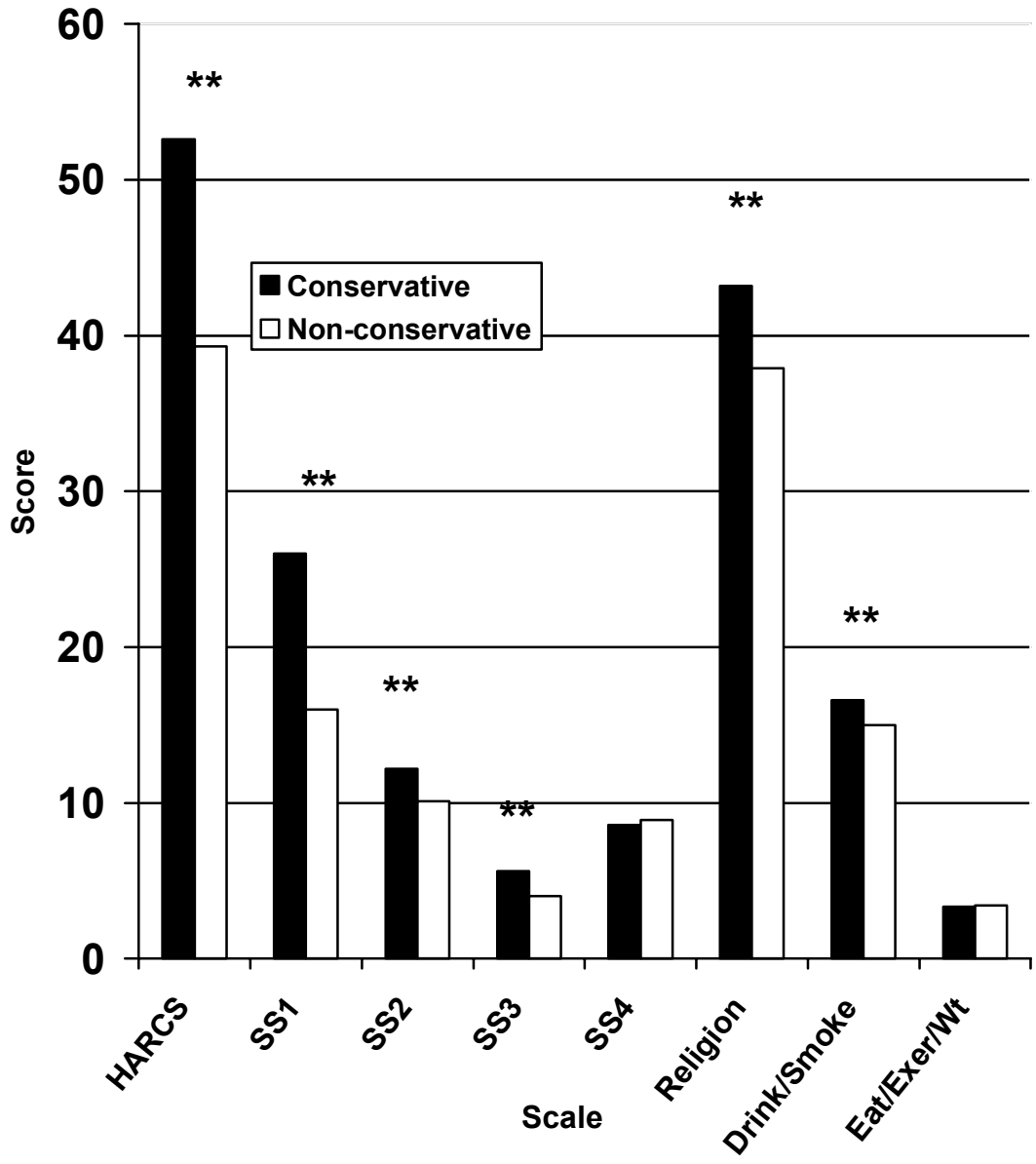

Figure 2. Comparison of individuals in conservative vs. non-conservative denominations on HARCS scores, Religiousness Scale scores (Religion), and Health Behavior scores. Drink/Smoke = sum score of 3 drinking and 2 smoking questions; Eat/Exer/Wt = sum score of 1 healthy eating question, 1 overeating question, 1 physical activity question, and 1 question about weight. SS1-General Religious Influence for Drinking and Smoking, SS2-Church Doctrine and Eating/Activity/Weight, SS3-Religious Commitment and Eating/Activity/Weight, SS4- Impact of Church Social Functions on Eating and Weight. ** = $p<.001$.

health behaviors would account for a significant amount of variance in the HARCS and HARCS subscales. For example, if religion is an influential factor in health behaviors, highly religious individuals who engage in healthy behaviors would probably score higher on the HARCS than individuals who engage in many unhealthy behaviors and consider themselves less religious.

The 25-item HARCS

Because no other comparable measures exist to establish content or convergent validity, the relationship of health behaviors and religiousness to the HARCS is useful in validating the HARCS construct. In order to statistically examine the validity of the HARCS, hierarchical regression was used. Hierarchical regression can establish how much of the variance in the HARCS is accounted for by age, gender, religiousness, health behaviors, and the interaction of health behaviors and religiosity. This type of statistical technique is especially useful when multiple variables are correlated (see correlation matrix, Table 9). Using SPSS software, HARCS scores and HARCS subscale scores were entered as dependent variables. Age and gender, health behaviors, religiousness variables, and an interaction term were then added as the independent variables. F tests were computed to test the significance (change in R square) of adding the independent variables in different sequences.

The purpose of the first hierarchical regression was to determine the amount of variance within the 25-item HARCS that could be accounted for by religious measures and health behaviors. Total HARCS score was entered as the dependent variable. Age and gender were entered in block 1. Block 2 included the sum of 9 health questions (numbers 2, 3, 8, 10, 12, 13, 14, and 15, from Table 6). Question number 3 was transposed to a dichotomous answer (daily smoker or nonsmoker) and question 12 combined normal weight and overweight as an answer (leaving five possible responses). Overall, two excessive drinking questions, one question about drinking frequency, two dichotomous questions regarding smoking, one question asking individuals to categorize their weight, one question about the overall healthfulness of diet, one overeating question, and one question regarding the frequency of exercise were included. The possible scores for each health behavior coincided closely with the ratio of questions in the HARCS. For

example, six of the 25 HARCS questions query about drunkenness whereas only 3 questions ask about weight. Hence, two of the nine questions used to determine a health behaviors sum score are related to drunkenness whereas only one question about weight was included.

Block 3 included three variables; the Religiousness Scale score, a religiousness conservativeness rating score provided by participants, and a dichotomous affiliation categorization found in Appendix A. Block 4 was a health/religion interaction variable; achieved by multiplying the score on the Religiousness Scale by the sum of the 9 health questions. Using these 4 blocks, a significant model emerged ($F_{7,207} = 18.65$, $p < .001$). Adjusted R square was equal to .37, indicating that these 4 blocks of variables accounted for 37 percent of the variance in the HARCS. Only model 1 and model 3 showed significant R change values, indicating that age and religious variables accounted for the majority of the variance in the HARCS (see Table 10 for R square change statistics for each level and beta weights for each variable).

Health questions did not account for significant variance in the HARCS when entered after age and gender. When entered into the first model, health questions accounted for a significant, yet relatively small amount of variance ($F_{1,213} = 5.84$, $p < .05$; Adjusted R square = .02). In addition, the interaction between health behaviors and religiousness did not account for variance beyond that attributed to the other 3 blocks of variables. As shown in Table 10, religious variables accounted for variance beyond that accounted for by age. In order to determine if age accounted for variance beyond that accounted for by religion, age was entered in block 3 after health questions (block 1) and religious variables (block 2). Results indicated that age did account for variance beyond health behaviors and religious variables (R square change = .02, $F\ change_{1,209} = 6.34$, $p < .05$).

Subscale 1 - General Religious Influence on Drinking/Smoking

Similar hierarchical regression analyses were performed to determine the variables which accounted for significant variance in Subscale 1 - General religious influence on drinking/smoking. Subscale 1 was entered as the dependent variable. Age and gender were entered into block 1 as independent variables. Block 2 consisted of the 5 questions related to drinking and smoking (the same

Table 10.

Summary of Hierarchical Regression Analysis for Variables Predicting HARCS Total Score (N=215)

Model	Variable	Standardized Beta	Adjusted R square	F change
1	Age	.39*		
	Gender	.08	.16	20.75*
2	Age	.37*		
	Gender	.09		
	Health Questions	.09	.16	2.13
3	Age	.16***		
	Gender	.04		
	Health Questions	-.02		
	Religion Questionnaire	.18***		
	Religious Self-Ranking	.28*		
	Affiliation	.27*	.37	24.11*
4	Age	.16***		
	Gender	.03		
	Health Questions	-.17		
	Religion Questionnaire	-.01		
	Religious Self-Ranking	.28*		
	Affiliation	.27*		
	Interaction (HQ x religion)	.27	.37	.37

Note. *p <.001, **p<.01, ***p<.05, HQ = Health Questions

drinking/smoking questions used in the regression with the 25-item HARCS as the dependent variable).

Religious variables were entered in block 3, and block 4 was the product of the Religiousness Scale and the five drinking/smoking questions. Results of the regression, using all 4 levels of independent variables, were significant and explained approximately 50% of the variance in the subscale ($F_{7,207} = 31.85$, $p < .001$; Adjusted R square = .50). Each of the 4 steps in the hierarchical regression yielded significant R square change when entered in the described order. This analysis showed that the interaction between drinking/smoking behaviors and religiousness accounted for variance beyond that

attributed to the other variables. Table 11 shows R square change statistics and beta weights for the analyses.

In order to determine if health questions accounted for variance beyond that attributed to age and religious variables, the sum of health questions was entered in block 3 whereas religious variables were entered into block 2 (age and gender remained in block 1). The amount of variance accounted for by drinking and smoking behaviors (beyond that attributed to age, gender, and religious variables) approached statistical significance (R square change = .01, $F\ change_{1,208} = 3.54$, $p = .06$). In order to determine if age accounted for variance beyond drinking/smoking behaviors and religious variables, it was entered in block 3. Results showed that age did not contribute to additional variance after accounting for religious variables and drinking/smoking behaviors.

Subscale 2 – Church Doctrine and Eating/Activity/Weight

Subscale 2 has 7 items which query individuals about their church teachings related to eating, physical activity, and weight. Validity tests of the scale included hierarchical regression using subscale 2 scores as the dependent variable. The first hierarchical regression included the following independent variables: block 1 – age and gender, block 2 – the sum of 4 health questions (the same eating/activity/weight questions used in the regression with the 25-item HARCS as the dependent variable), block 3 – religious variables, and block 4 – the interaction variable (the product of the four health questions and the Religiousness Scale total score). When all blocks were analyzed together a significant model emerged ($F_{7,207} = 3.23$, $p < .005$; adjusted R square =.07). Although this model was statistically significant, the total variance accounted for by the variables was only 7 percent. In addition, the only significant R square change was block 1, suggesting that health behaviors did not account for a significant amount of variance beyond that accounted for by age and gender. Likewise, religious variables did not account for a significant amount of variance beyond that accounted for by age, gender, and health behaviors. An interaction between religion and health behaviors was not evident. Table 12 shows R square change statistics and beta weights for the analyses.

Table 11.

Summary of Hierarchical Regression Analysis for Variables Predicting Subscale 1 Score – General Religious Influence on Drinking/Smoking (N=215)

Model	Variable	Standardized Beta	Adjusted R square	F change
1	Age	.40*		
	Gender	.08	.16	21.19*
2	Age	.25**		
	Gender	.06		
	Drink/Smoke	.31*	.28	19.66*
3	Age	.09		
	Gender	.02		
	Drink/Smoke	.11		
	Religion Questionnaire	.19**		
	Religious Self-Ranking	.32*		
	Affiliation	.30*	.47	33.68*
4	Age	.06		
	Gender	.01		
	Drink/Smoke	-.69**		
	Religion Questionnaire	-.77**		
	Religious Self-Ranking	.31*		
	Affiliation	.30*		
	Interaction (D/S x religion)	1.51*	.50	13.60*

Note. *p <.001, **p<.01, ***p<.05, D/S = Drinking and Smoking Questions

In order to determine if age accounted for variance beyond that accounted for by health behaviors, health behaviors were entered in block one and age into block 2 of the hierarchical regression analysis. Results illustrated that health behaviors did not account for a significant amount of variance when entered as an independent variable into step 1. Age accounted for variance beyond that of health behaviors (R square change = .07; $F\ change_{\ 1,212} = 14.70$, $p < .001$). To determine if religious variables accounted for variance beyond that accounted for by health behaviors, and if age accounted for a significant amount of variance beyond health behaviors and religious variables, independent variables were entered as follows:

block 1 – health behaviors, block 2 – religious variables, block 3 – age. Results showed that religious variables accounted for variance beyond that attributed to health behaviors (R square change =.08; *F change* $_{3,210}$ = 5.81, p <.01). In addition, age accounted for a significant amount of variance beyond that attributed to health behaviors and religious variables (R square change = .02; *F change* $_{1,209}$ = 4.05, p <.05).

Subscale 3 – Religious Commitment and Eating/Activity/Weight

Validity tests for subscale 3 included entering it as the dependent variable in a hierarchical regression. Independent variables were entered in the same fashion as described for subscale 2 (block 1 – age and gender, block 2 – health questions, block 3 – religious variables, block 4 – interaction variable). Table 13 summarizes the R square change statistics and beta weights for each of the levels. Examining all blocks together, a significant model emerged ($F_{7,207}$ = 3.60, p <.01; adjusted R square =.08). Significant R square change was found for block 1 and block 3. These results demonstrate that health behaviors did not account for a significant amount of variance beyond that accounted for by age and gender, and religious variables accounted for a significant amount of variance beyond that accounted for by age, gender, and health behaviors. No significant interaction between religion and health behaviors was found.

To determine if age accounted for variance beyond that accounted for by health behaviors, health behaviors were entered in block one and age into block 2 of the regression analysis. Results illustrated that health behaviors did not account for a significant amount of variance when entered as an independent variable into step 1. Age did account for variance beyond that of health behaviors (R square change = .05; *F change* $_{1,212}$ = 12.00, p <.01).

To determine if religious variables accounted for variance beyond that accounted for by health behaviors, and if age accounted for a significant amount of variance beyond health behaviors and religious variables, independent variables were entered as follows: block 1 – health behaviors, block 2 – religious variables, block 3 – age. Results showed that religious variables accounted for variance beyond

that attributed to health behaviors (R square change =.10; $F\ change_{3,210} = 7.51$, $p < .001$). Age did not account for a significant amount of variance beyond that attributed to health behaviors and religious variables.

Table 12.

Summary of Hierarchical Regression Analysis for Variables Predicting Subscale 2 Score – Church Doctrine and Eating/Activity/Weight (N=215)

Model	Variable	Standardized Beta	Adjusted R square	F change
1	Age	.26*		
	Gender	.05	.06	8.02*
2	Age	.26*		
	Gender	.05		
	Eat/Exercise/Weight	-.01	.06	.01
3	Age	.16***		
	Gender	.03		
	Eat/Exercise/Weight	-.02		
	Religion Questionnaire	.10		
	Religious Self-Ranking	.06		
	Affiliation	.10	.07	2.10
4	Age	.16***		
	Gender	.04		
	Eat/Exercise/Weight	.14		
	Religion Questionnaire	.20		
	Religious Self-Ranking	.05		
	Affiliation	.10		
	Interaction (E/E/W x Rel)	-.19	.07	.20

Note. *p <.001, **p<.01, ***p<.05, E/E/W = Eating, Exercise, and Weight Questions, Rel = Religiousness Scale.

Table 13.

Summary of Hierarchical Regression Analysis for Variables Predicting Subscale 3 Score – Religious Commitment and Eating/Activity/Weight (N=215)

Model	Variable	Standardized Beta	Adjusted R square	F change
1	Age	.22**		
	Gender	.03	.04	5.75**
2	Age	.23**		
	Gender	.03		
	Eat/Exercise/Weight	.06	.04	.83
3	Age	.12		
	Gender	.02		
	Eat/Exercise/Weight	.06		
	Religion Questionnaire	.07		
	Religious Self-Ranking	.10		
	Affiliation	.17***	.08	4.09**
4	Age	.12		
	Gender	.02		
	Eat/Exercise/Weight	-.09		
	Religion Questionnaire	-.03		
	Religious Self-Ranking	.11		
	Affiliation	.17***		
	Interaction (E/E/W x Rel)	.18	.08	.19

Note. *p <.001, **p<.01, ***p<.05 E/E/W = Eating, Exercise, and Weight Questions

Subscale 4 – Church Social Functions and Eating/Weight

Subscale 4 consists of three items dealing with how church involvement impacts eating and weight. In an attempt to determine what factors account for variance in the scale, subscale scores were entered as the dependent variable in the hierarchical regression. The following independent variables were also entered: block 1 - age and gender, block 2 – three health questions (the same health questions used in subscale 2 and 3 analyses except the exercise question was eliminated), block 3 – religious variables, and block 4 the

interaction variable (the product of health behaviors score and Religiousness Scale score). Results of the regression, using all 4 levels of independent variables, did not reveal a significant model. In addition, regression analyses using each of the 4 variables in the first block were calculated. None of the analyses yielded significant results. Therefore, none of the variables contributed a significant amount of variance to the scale.

DISCUSSION

One primary aim of this study was to test whether the factor structure of the HARCS, determined previously in a highly religious sample, could be confirmed in a more religiously diverse sample. Using current data, confirmatory factor analyses failed to confirm the factor structure found in the pilot study. The pilot study factor structure was derived from a somewhat religiously homogenous sample. By comparison, the current study examined the HARCS in a more religiously diverse sample. To examine the possibility that the current sample might provide a more stable factor structure, exploratory factor analysis was conducted using this data. To determine the stability of this new scale, confirmatory factor analysis was conducted using pooled data from both the pilot study and the current investigation. Test-retest reliability was determined for the subsequent scale and its subscales. Validity tests were conducted to determine the variables which could account for significant variance in this revised HARCS scale as well as each subscale.

Therefore, confirmatory factor analysis showed that the factor structure of the pilot study was not a good fit to the current data. Failure to confirm models with CFA is common and is generally due to substantive, methodological, and/or statistical reasons (Van Prooijen & Vand Der Kloot, 2001; Nasser & Wisenbaker, 2003). Substantive explanations are generally related to differing participant characteristics that result in incongruent response patterns between individuals in the exploratory and confirmatory analyses. One methodological explanation of poor CFA results is inadequate applications of data reduction procedures which in turn leads to erroneous initial factor solutions. Another methodological reason for lack of correspondence between PCA and CFA is the data-driven nature of PCA in comparison to the theory-driven methods of CFA.

In PCA, items can load on multiple factors, whereas with CFA low item loadings are generally fixed to zero. Therefore, the conservative nature of CFA often contributes to poor results when using CFA. Van Prooijen and Vand Der Kloot (2001) demonstrated the latter of these methodological problems by studying CFA performed on the same data as the exploratory analysis. In their investigation

they examined 10 factor structures from previously published papers and compared CFA results at 3 different levels of parameter constraint. One model added high pattern coefficients as free parameters and fixed low pattern coefficients to zero. In this model 7 of the 10 factor structures could not be confirmed. In a somewhat less constrained model, 3 out of the 10 factor structures could not be confirmed, illustrating some of the inherent methodological issues related to the use of CFA.

From a statistical perspective, Nasser and Wisenbaker (2003) showed that increased sample size, normality of data (decreased skewness and kurtosis), and factors with fewer items increased Goodness of Fit Indices. In the current study, sample size was in the minimally acceptable range for CFA. In addition, factor 1 of the pilot study was somewhat large, containing 13 items. Therefore, these two statistical issues may have contributed somewhat to the poor results of the CFA in the current study.

Although methodological and statistical issues may have contributed to the lack of fit of the current data to the pilot-study factor structure, fit indices were far from acceptable. In addition, some participant characteristics were clearly different in the current study compared to the pilot study. Due to these two factors it is probable that the inability to confirm the original factor structure was primarily due to substantive factors. For example, 52% of the participants in the pilot study were Southern Baptist, compared to only 14% of the participants in the current study. Southern Baptists are generally recognized as a theologically conservative denomination as well as relatively strict with regard to their stances on alcohol and smoking. For instance, Olson and Perl (1990) surveyed clergy from 625 congregations representing the 5 following denominations: Assemblies of God, Southern Baptist, Catholic, Lutheran, and Presbyterian. The clergy were asked if their congregation taught that Christian life should be safe-guarded through abstinence from such things as certain foods, alcohol and/or tobacco, gambling, and certain types of entertainment. Results showed that the Assemblies of God and Southern Baptist congregations had the highest strictness scores.

Other religious-related participant characteristics may have also contributed to the poor fit of the current data to the proposed factor structure. Although 64% of the participants in the current study were

classified as "conservative", many of the denominations are more moderately conservative than Southern Baptists (Smith, 1990). In addition, more participants in the second sample were of the Catholic faith, which is not proscriptive with regard to moderate alcohol consumption. Further support of the difference between participants of the two studies is found when examining the scores on the Religiousness Scale. Total Religiousness Scale scores were higher for individuals in the pilot study ($M = 47.23$, $SD = 6.39$) compared to those in the current study ($M = 41.33$, $SD = 7.97$), $t(523) = 9.02$, $p < .001$ (one-tailed), supporting the notion that the current sample was more liberal in their religious views.

Due to the notion that sample characteristics were primarily responsible for the poor fit of the factor structure between the two studies, a PCA was conducted on the current data. This approach seemed logical especially because the current sample was more religiously diverse than the pilot study sample. Determining the factor structure of a more heterogeneous sample could provide a factor structure that more generally reflects the views of individuals from different religious affiliations and those possessing varying degrees of religious commitment. The findings of this PCA (on the current sample) are consistent with the notion that participant characteristics were responsible for the poor fit of the original CFA. That is, the PCA of the current data resulted in factor structure changes that reflect a more religiously diverse sample.

Principal Components Analysis of the Current Data

The results of the PCA on the current data revealed a factor structure which was similar to that obtained in the pilot study. The results exhibited modifications to factors 1 and 2. In the pilot-study HARCS, factor 1 was a 13-item subscale (General Religious Influence on Drinking/Smoking). This subscale contained questions regarding how personal religious beliefs and church doctrine impacted views on alcohol consumption and drunkenness. In addition, there were two questions regarding church doctrine and smoking. Therefore, in the pilot sample, church doctrine and personal religious beliefs regarding these behaviors covaried in a manner that suggested 1 large factor. In the current sample, however, questions about church doctrine and abstinence did not covary to the same degree with the other

items in subscale 1, leading to 4 questions being dropped from the scale. Overall, 2 questions about church doctrine and alcohol (*An important part of the teachings of my church is abstaining from alcohol* and *My church takes a stand against drinking alcohol*) and 2 similar smoking questions were not retained when performing PCA with the current data. In addition, one question from subscale 2 of the pilot data (*My church discourages being overweight*) did not load on any factor. In summary, conducting PCA of the current data led to the elimination of 5 items. All of these items were related to denominational teachings. These modifications are consistent with the fact that the pilot sample primarily consisted of two denominations, suggesting that these items may have been somewhat idiosyncratic to those denominations.

Two items that did not load on any factor in the pilot-study HARCS loaded on factor 1 when PCA was conducted on the current data. These questions were smoking questions (*My personal religious beliefs influence whether or not I smoke cigarettes* and *According to my personal religious beliefs it is wrong to smoke cigarettes*). These items were included in the current study because smoking rates were very low in the pilot study. Anticipating that smoking rates would be higher in the current study, it was believed that this could impact responses to smoking questions. Because the possibility of refining the scale existed, having additional smoking questions seemed prudent.

Confirmatory Factor Analysis of the Revised HARCS

In order to determine if the factor structure obtained through PCA of the current data was potentially a stable factor structure, data from the current study and pilot study were pooled and CFA was performed. Although performing CFA with the same data that was used for data reduction is not typical, it is an acceptable practice to show potential factor structure stability (Anton, et al., 2007; Van Prooijen & Vand Der Kloot, 2001). Even though a good fit does not assure future data will fit the exploratory model, a good fit does reduce the chances that methodological reasons are responsible for a lack of confirmation with future data. Results yielded acceptable Goodness of Fit Indexes indicating that the factor structure was stable.

Test –Retest Reliability

In this investigation, test-retest reliability was determined by the correlation between two administrations of the HARCS separated by approximately 2 weeks. The correlation was high for subscale 1 (r = .92). Three of the 5 remaining subscales were at the low end of generally accepted reliability coefficients (.70 -.74). The other 2 scales were eliminated because they lacked temporal stability. All of the questions in The Religious Connectedness to Eating/Activity/Weight Scale (r = .58) were negatively worded. Gorin (2005) reported that increasing negative wording of items made questions more difficult to comprehend. Therefore, it is possible that some questions were misunderstood. It is also possible that even though participants may have understood the questions, more cognitive resources were required to do so. This additional effort may have influenced responses in a manner similar to "test fatigue".

The other subscale that was deleted from the HARCS, Peer Influence on Smoking and Drinking, included hypothetical situations and asked if the participant would be comfortable in that situation, i.e. "I would feel comfortable if my church friends witnessed me getting tipsy at a social function". Providing responses to hypothetical situations may be more difficult than expressing views about doctrinal or personal beliefs. Because answers to hypothetical questions often depend on a number of factors (which church friends?), participants may have thought of the situations differently at time 1 and time 2.

Another possible explanation for poor test-retest reliability on these two scales is that the individuals did not feel strongly about their response and therefore other factors may have easily swayed their answers. An example of this type of phenomenon can be observed in politics. Those who affiliate strongly with one political party are not easily convinced to vote for a candidate outside of their party. By contrast, political strategists understand that swing voters' opinions may vacillate due to many factors (Chappell & Keech, 1986). From a religion and health perspective, research supports that alcohol consumption and smoking are often strongly associated with religious beliefs. Therefore these beliefs seem less susceptible to contextual influences. However, it appears that eating and physical activity are

not as strongly linked to religiosity. Therefore views may be more labile, more easily influenced by contextual or environmental factors. Therefore, the question format, combined with the possibility that individuals may have not had strong convictions about the items, may have led to poor test-retest reliability on the eliminated scales.

It is always possible that unique participant characteristics contributed to test-retest consistency. For example, 62% of those completing the retest were undergraduate students, but students only made up 28% of the entire sample. Comparing all of those who took the retest (including non-students) to those who did not complete the retest, independent sample t-tests revealed significant differences on some variables. Age (M = 36.18, SD = 21.71 vs. M = 43.14, SD = 15.56, $p < .05$) and BMI (M = 26.20, SD = 4.21 vs. M = 31.26, SD = 11.52, $p < .001$) were lower in those taking the retest. In addition those taking the retest scored lower on the Religiousness Scale (M = 39.18, SD = 8.26 vs. M = 42.31, SD = 7.67, $p < .05$). Because of these differences the likelihood that student status was related to variable retest responses was examined. Data from individuals who had a retest change score that equaled or exceeded 20% (1 point average on the Likert Scale) on items from either of the two eliminated scales were identified. Examining the responses to both subscales, 23 of 134 scores deviated 20% or more from time 1 to time 2. Of those 23 scores, 12 were students and 11 were non students. This suggests that student status was not a confounding variable in test-retest reliability of the two eliminated scales.

Validity Tests

The 25-item HARCS

Hierarchical regression showed (see Table 10) that 37% of the total scale variance of the HARCS could be accounted for by age, gender, health behaviors, religiousness variables, and an interaction term (health behaviors X religiousness). Hierarchical regression also demonstrated that unique variance could be attributed to age and religious variables. Beta weights (Table 10) showed that each religious variable accounted for a significant amount of variance when all other variables were controlled. Therefore it

appears that religious denomination, perceived religious conservatism, personal religiousness, and age were the primary contributors to the HARCS scale as a whole.

Although health behaviors contributed to a significant amount of variance when entered first into the hierarchical regression, it did not account for variance beyond that attributed to age and religious variables. One possible contributing factor to this is that a sum score was used for the health questions. Because a wide range of health behaviors were sampled, some of the health questions may have been endorsed in opposite directions (i.e. healthy eating yet excessive drinking). Therefore a sum score may have been a very conservative estimate as to how much health behaviors contributed to the variance in the overall scale. Regression analyses using each subscale as a dependent variable allowed for a more direct determination of how much individual health behaviors attributed to variance in the HARCS.

Summary of Subscale Findings

With the exception of subscale 1, validity tests were able to account for only small amounts of variance in the subscales. In subscales 2 and 3, religious variables and age were the only variables that accounted for statistically significant amounts of variance. Health behaviors did not account for significant amounts of variance in subscales 2 and 3, suggesting that these subscales have little predictive value related to eating, physical activity, and body weight. Validity tests of subscale 4 were unable to account for significant amounts of variance, indicating that this subscale was not related to factors that were measured in this study. The inability to account for variance in subscales 2-4 was most likely related to the observation that these health behaviors have little religious relevancy in the group of individuals tested.

In comparison to the other subscales, subscale 1 was robust. This subscale queries individuals about religion as it relates to drinking and smoking, whereas the other subscales are related to eating, activity, and body weight. Validity tests were able to account for meaningful amounts of variance in the subscale primarily related to religious variables. However, variance was also attributed to age, drinking/smoking behaviors, and the interaction of religiousness with drinking/smoking behaviors. Data

indicated that subscale 1 had greater variability in responses than the other subscales. Therefore, it appears that for some individuals smoking and drinking behaviors have religious relevancy and these beliefs impact behaviors to some extent.

Subscale 1 - General Religious Influence on Drinking/Smoking

Hierarchical regression of Subscale 1 showed that approximately half of the variance in the scale could be explained by age, health behaviors, and religious variables. Age did not account for variance beyond that attributed to religious variables and health behaviors. The impact of health behaviors was marginally significant, accounting for approximately 1 percent more variance beyond that attributed to age and religious variables. These findings indicate that Subscale 1 was most strongly influenced by religious variables. However, religiousness interacted with health behaviors to account for more variance than those variables did separately. Therefore, subscale 1 appears to measure religious characteristics (personal religiousness, personal religious conservativeness, and denominational conservativeness) in the context of drinking alcohol and smoking. Standardized beta weights in model 3 of Table 11 showed that each religious variable accounted for a significant amount of variance when all other variables were controlled. This finding suggests that although these variables may be correlated, each is an important component of Subscale 1 of the HARCS.

Compared to all other subscales, religion and health behaviors accounted for much of the variance in Subscale 1. In light of the many studies showing an inverse relationship between alcohol consumption/smoking and religiosity (Koenig, McCullough, & Larson, 2001), this is not surprising. The validity findings of this subscale compared to the findings of the other subscales further support the idea that in a religious context, drinking and smoking are more salient health behaviors compared to eating, physical activity and weight.

Subscale 2 - Church Doctrine and Eating/Activity/Weight

The observation that validity tests could only account for 7% of the total variance in Subscale 2 was noteworthy. This finding probably relates to several factors. The most face valid explanation is that in this sample, religious doctrine has little saliency with regard to eating and exercise behaviors. The variability in Subscale 2 responses were primarily between "strongly disagreeing" and "undecided" about religious doctrine having an impact on eating/activity/weight. In fact, 80% of all responses to items within this subscale were 0 (strongly disagree), 1 (disagree), or 2 (undecided). Examining the sum scores for the entire subscale, only 9 of 215 participants scored 21 or more. A score of 21 means that the average score for each item was "3 – agree". A truncated response pattern, such as collapsing interval data into fewer categories, is known to decrease R square. However, the reduced variability in responses on this scale was not driven by statistical manipulation but instead by response patterns.

The PCA of the current study resulted in an almost identical factor structure for these items as the pilot data (1 item was dropped from the subscale, but otherwise there were not changes). In addition Cronbach's alpha (.91) suggested a unidimensional latent construct. Therefore, subscale 2 has potential as a useful subscale. An improved explanation of the variance in the scale may require including more participants who attend churches that heavily promote healthy eating and exercise. By including these churches, the variability of responses on this subscale would increase, providing a more normal distribution of scores.

This subscale has relevance within a social-cognitive model of health behavior. For instance, the Theory of Reasoned Action (Fishbein & Ajzen, 1975) and Theory of Planned Behavior (Ajzen, 1991) include subjective norms as a component to explain behavior. Subjective norms, or the expectation of others, parallels what this scale measures. The difficulties in predicting eating and exercise behavior from subjective norms have previously been demonstrated. Some studies show that subjective norms predict intentions but have only marginal effect on behavior (Sheeran, Norman, & Orbell, 1999; Armitage, 2005). Therefore, even in future studies which may recruit individuals that are more likely to integrate doctrinal

beliefs and eating/exercise, it is possible that this subscale may relate to the intent to exercise and eat healthy more so than actually predicting current behaviors. Future investigations using this subscale may consider measuring behaviors as well as intentions to carry out the relevant behaviors.

Hierarchical regression showed that age accounted for variance beyond that attributed to health behaviors and religious variables. Although the overall variance was quite small, this is still an interesting finding. As a result of learning and experience, aging generally leads to refined belief systems, such as those related to religion. In addition, it could be expected that older individuals, who have consistently attended a specific church or denomination, would have a greater understanding of church doctrine than younger individuals. Although not directly tested in this study, it is possible that age is an important factor in understanding the nuances of church doctrine. In addition, older individuals have greater health concerns than younger people and often use religion to cope with illness (Koenig, McCullough, & Larson, 2001). Therefore, it is possible that health problems and the behaviors related to them may be placed into a religious context more often as individuals age. It is also possible that religious influences upon health behaviors and beliefs can only be understood in terms of an historical context.

Subscale 3 – Religious Commitment and Eating/Activity/Weight

Validity tests for subscale 3 have similar considerations as subscale 2. First, only a small amount of variance was accounted for by the independent variables. Secondly, few individuals answered in the direction of indicating that religious commitment and eating/activity/weight were positively related. When examining the variability of the data, 86% of the responses fell between "strongly disagree" to "undecided". Only 5 of the 215 subjects averaged at least a "3 – agree" on the scale. Tests of reliability were satisfactory for the scale, suggesting that the subscale could be useful in studies where participants perceived religious beliefs to be more relevant to these health behaviors. For instance, this scale may be more useful among individuals affiliated with the Church of the Latter Day Saints or Seventh Day Adventists, as diet and physical activity are more closely tied to their creeds than in other religions

(Enstrom, 1989; Hunt, Murphy, & Henderson 1988). In addition, this scale may be of utility for pre/post measures among individuals seeking faith-based treatment for obesity or binge eating.

Health behaviors did not account for a significant amount of variance in this scale. Instead, religious variables were the only independent variable that accounted for variance beyond what was accounted for by the remaining two levels. Because of the wording of the questions on this subscale it is possible that these questions tap into a dimension of religiosity not measured in the study. The questions in subscale 3 refer to others' commitment to God in relation to their eating, activity and weight. Therefore, this scale may be influenced by how comfortable one is in assessing the morality of another person's behavior. Although most Judeo-Christian affiliations denounce being judgmental, religious individuals and church teachings are often somewhat idiosyncratic with regard to what is considered trying to help someone change their ways versus being overly judgmental.

Subscale 4 – Church Social Functions and Eating/Weight

Subscale 4 is quite different from the other three subscales. Whereas the other 3 subscales measure personal/institutional religious beliefs and the degree which they promote healthy behaviors (proscribe unhealthy behaviors), subscale 4 queries about how the environment of church may lead to unhealthy eating and weight problems. When hierarchical regression was conducted in a manner consistent with the other scales, none of the independent variables accounted for a significant amount of variance. The different type of questions in this scale may explain the observation that religious variables did not account for variance in this scale.

As the other subscales have demonstrated, being religious (and somewhat religiously conservative) may increase the importance of all health behaviors from a religious context. However, the more religiously involved someone is, the more likely they socialize with others in the church. Even in church settings, socializing often includes foods which are not considered healthy. Therefore it is doubtful that religiousness or religious conservativeness would account for variance in a health protective direction. It seems more likely that being more religious would lead to lower scores on this scale

(indicating religion has a negative influence on eating and weight). Although in the current study hierarchical regression did not show this trend, the pilot study indicated that the more conservative religion (Baptists) scored significantly lower than Methodists on this scale. From a validity standpoint, this scale may be subject to opposing religious influences, a theologically protective influence and a negative environmental influence.

Similar to subscales 2 and 3, this subscale also showed little variance beyond responses in the "strongly disagree" to "undecided" range. Eighty-nine percent of the scores on the three items fell in this category. These results suggest that few people see church social functions as problematic for eating and weight. However, the current study intentionally recruited individuals who were less religious and therefore potentially less involved in church. Data from the pilot study indicates that this scale may be more relevant in Baptists who frequently attend church. Looking at Baptist data only, approximately 20% of the scores indicated agree or strongly agree with items in this scale. This degree of affirmation is almost twice as high as those in the current study.

Because the pilot study had more variability with regard to this subscale, that data was reanalyzed to see if some of the variance in the scale could be accounted for. A hierarchical regression was performed using the sum score for subscale 4 as the dependent variable. The score on the question "How often do you eat more than you should?" was entered as the only independent variable in block 1. Block 2 consisted of two religious questions: 1) On the average, how often have you attended religious worship services (i.e., Sunday morning, evening, and/or other days) during the last year, and 2) How often do you serve a church or other religious organization in Sunday school teaching, church project leadership, or other responsibilities? The results showed a significant model ($F_{3,304} = 4.09$, $p < .01$; Adjusted R squared = .03). In addition adjusted beta weights were negative indicating that increased religiosity and church involvement had a negative influence on eating and weight.

Although only 3 percent of the variance was accounted for using pilot study data, it does appear that dietary disinhibition and religious involvement may be components of this scale. It is feasible that

questions on this scale could be part of a larger construct that is not caused by religion but can take place in a religious environment. For instance, this factor may be related to dietary disinhibition but a religious environment is simply a place where these behaviors are expressed. If this is true, it would be necessary to measure this construct in participants who were exposed to religious-based food "temptations" somewhat frequently. Future use of this scale should consider using other validated scales, such as Stunkard and Messick's Three-Factor Eating Questionnaire (1985), which could potentially provide convergent validity.

CONCLUSION

The results of this investigation showed that the factor structure of the pilot-study HARCS (Creel, Williamson, Copeland, & Businelle, 2005), derived from a highly religious sample, was not stable in a more religiously diverse sample. However, PCA of the current sample revealed a slightly modified factor structure. This factor structure was confirmed when pooling data from the current sample with that of the pilot study. Test-retest reliability showed that two subscales had poor temporal stability and therefore were eliminated from the HARCS. After eliminating another scale because of little variance and limited utility, a 25-item HARCS remained. The revised HARCS contained 4 subscales.

The scale modification procedures that were conducted appear to have resulted in a scale with a stable factor structure. In addition, the 4 subscales have acceptable test-retest reliability. However, validity tests of 3 of the 4 subscales accounted for minimal amounts of variance. For these subscales, statistical analyses were unable to clearly elucidate what was being measured. A logical response to these results is to consider the utility of the scale for future research and/or clinical activities related to these health behaviors. The problems encountered in developing the HARCS also suggest broader implications in regard to the relationship between religious beliefs and health behaviors.

What Does the HARCS Measure?

The HARCS was developed based on the notion that religion can fit into a social-cognitive model of health behavior. For instance, in the Theory of Planned Behavior, human action is posited to be guided by the following: 1) behavioral beliefs which consist of likely outcomes of behavior and the evaluation of these outcomes, 2) normative beliefs, or the beliefs about the expectations of others and motivation to comply with these expectations, and 3) control beliefs which include factors that that may facilitate or impede performance of the behavior and the perceived power of these factors (Ajzen, 2006). In this model, these three beliefs result in attitudes toward behaviors, social pressure to perform behaviors, and perceived behavioral control. These factors in turn lead to the formation of behavioral intentions. Behavioral intentions are more likely to coincide with behaviors the higher the *actual* behavioral control

(Ajzen & Fishbein, 2005), the less hypothetical the situation under which intentions were expressed (Ajzen, Brown, & Carvajal, 2004), and the higher the self-efficacy to perform the behavior (Bandura, 1998).

In the current study, behavioral and normative beliefs about health behaviors were queried from a religious perspective. Consistent with the behavioral beliefs construct of the TPB, items are related to personal religious beliefs and health behaviors. In addition, normative beliefs were sampled by inquiring about denominational beliefs related to drunkenness, eating, physical activity, and weight management. Items related to how religious socialization affects eating and weight are consistent with the perceived behavioral control construct of the TPB. Items on the HARCS are straightforward with regard to questioning individuals about their beliefs or the beliefs of their church congregation. In addition, PCA yielded similarly-worded items aggregating in several of the factors. Therefore, it appears relatively clear that questions are measuring personal and denominational religious beliefs regarding the health behaviors of interest.

The inability to account for a great deal of variance in subscales 2-4 should not preclude the validity of those subscales. Although the validity tests were probably appropriate for subscale 1 (since drinking and smoking behaviors tend to be salient from a religious context) those same variables may not have adequately tested the validity of subscales 2-4. To validate these subscales, or show that they measure what they purport to measure, individuals who are clearly integrating religion into their eating and activity patterns should be queried. If subscales 2-4 are measuring the congruency of health and religion, these individuals should score higher than individuals who don't integrate their religion into these behaviors. For example, individuals who complete theologically-integrated, church-based cardiovascular fitness programs or faith-based weight management programs should score higher on these scales than individuals found in the general public.

Although the wording of the items in the HARCS provides face validity with regard to the beliefs it is measuring, this study was not successful in identifying behavioral or contextual factors that could

account for the variability in beliefs in three of the four subscales. With the exception of subscale 1, this inability to account for the variance in the scale appeared to be linked to the religious relevancy of questions related to eating, activity, and weight. As Ajzen (2006) has described, the product of belief strength and outcome evaluation form attitudes towards behavior. In this study, religious individuals may value their personal religious beliefs and the doctrine of their church (high outcome evaluation). However, if belief strength about the relevance of health behaviors to religion is very low, it is unlikely that attitudes towards those behaviors will be impacted. Therefore, to achieve high scores on the HARCS, religion should be an important life component and there should be a connection between religious beliefs and the health behaviors.

Although no questionnaire was found that directly parallels the HARCS, the Impact of Weight on Quality of Life Questionnaire - Lite Version (IWQOL-Lite) provides an interesting corollary (Kolotkin, Crosby, Kosloski, & Williams, 2001). The 31-item scale consists of two- part questions related to how weight impacts quality of life. Most questions begin with "Because of my weight" and then several domains (physical function, self-esteem, sexual life, public distress, and work) are addressed. For example, a physical function question on the scale reads "Because of my weight I have trouble with mobility". The IWQOL-Lite is a questionnaire often used in studies or clinical programs treating obesity. It has little relevance for individuals of normal weight. The HARCS is similar in that it has little relevance to individuals who are not religious. In addition, the IWQOL-Lite queries common weight-related domains. For instance, there is not a question "Because of my weight, I have nightmares". Although there may be individuals who have nightmares related to their weight, this is not a common occurrence. By comparison, it appears the HARCS has addressed some factors that are commonly relevant to religion (drinking and smoking) and some factors that are not religiously relevant (eating, activity, and weight) for most individuals.

Limitations

A primary aim of the study was to confirm the factor structure of the HARCS using a religiously diverse sample. Recruiting individuals with these characteristics appeared beneficial in determining the adequacy of the factor structure. On the other hand, the less religious sample may have limited the variance in some of the subscales. Less religious individuals are less likely to connect certain behaviors to their religion. This was especially evident in the eating/activity/weight oriented scales. Having a more diverse sample may have reduced the amount of variability that could be accounted for in these subscales because responses were truncated. Since very few of the individuals reported that religion influenced their eating/activity/weight, it is not surprising that religion and/or health behaviors did not account for very much variance in the scales.

Another limitation of the current study was sample size. Confirming the pilot-study factor structure may have at least partially been impacted by limited sample size in the current study. Although the study had over 5 participants per item (often stated as a minimum for CFA), research suggests that in some situations a larger sample size may be beneficial. In short, the number of indicators per factor and the magnitude of factor loadings appear to dictate the number of participants needed to confirm a factor structure (Gagne & Hancock, 2006). From a more practical standpoint, a larger sample size may have also allowed us to attempt confirmation of the pilot study model among only those who were highly religious. In addition, a larger sample may have also allowed some of the current questions about the content validity of the scales to be answered. For instance, if many of the participants were affiliated with religions that promote healthy eating and activity, the data from these groups could be examined independently to examine the extent to which behaviors and religious variables account for variance in the HARCS subscales.

Future Directions

The results of this study suggest that with respect to religious beliefs, all health behaviors are not viewed the same. Not only did the factor structure of the HARCS reveal this, but the tests of validity also

demonstrated that religious factors are more highly associated with drinking and smoking than to eating and physical activity. Although this outcome was anticipated, it was somewhat surprising that there was not a larger subset of individuals who viewed their religion as congruent to eating, exercise, and weight-related behaviors. Because so few individuals endorsed that eating, activity, and weight, had religious saliency, the utility of scales 2-4 in a general population of church attendees should be questioned. If the utility of these scales is questionable, then so is the HARCS as a general measure of health and religious congruency.

The present study was conducted among religiously diverse participants which were not selected according to their interest in health behaviors. In addition, church affiliations which are known to have more health-promoting creeds were not target populations of the scale. The sampling in the current study provided validation that subscale 1 could be useful in a diverse religious population. By comparison, the other subscales do not appear very useful in an average group of church attendees. Instead, these scales may be most useful in select groups of individuals. For instance, these subscales may be useful pre-post questionnaires for individuals participating in a faith-based health program. As the popularity of faith-based programs has grown in the past 10 years (DeHaven, Hunter, Wilder, Walton, & Berry, 2004), there is a need for assessment instruments that can help examine correlates of success.

The ultimate goal of the pilot study and the current study was to develop a comprehensive scale that could be used in future research examining the impact of religion on health behaviors. The results suggest that the smoking and drinking subscale may be most useful as a scale independent of the other subscales. Whereas subscale 1 could be used in a general religious population, the other subscales may be better suited for a very specific group of individuals. In order to use these subscales as separate measures, future research should be conducted. If subscale 1 is used, future factor analytic studies should test the stability of the 1 factor when these items are presented without questions related to diet, exercise, and weight. It appears that further validation of subscales 2-4 will be necessary prior to their use in other religion and health studies.

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APPENDIX A: ADDITIONAL QUESTIONS ADDED TO THE HARCS

1. My personal religious beliefs influence whether or not I smoke cigarettes.
2. According to my personal religious beliefs it is wrong to smoke cigarettes

APPENDIX B: DENOMINATION CLASSIFICATION*

Conservative Denominations	Non-Conservative Denominations
Baptist (all)	Catholic
Christian	Lutheran
Pentecostal/Charismatic	Episcopalian/Anglican
Jehovah's Witness	Presbyterian
Latter-day Saints/Mormon	Unitarian Universalist
Nazarene	Judaism
Church of God	African Methodist Episcopal
Church of Christ	Methodists/Wesleyen (all)

*Non-denominational churches and affiliations not contained in this list will be categorized according to conservative religious beliefs such as theology (bible inerrancy, salvation, etc.), social stances (abortion, homosexuality, etc.), and strictness related to personal behavior (gambling, alcohol use, etc.).

VITA

David B. Creel was born April 30, 1969, in Anderson, Indiana. He attended Indiana University where he completed a bachelor's degree in exercise science and took courses in nutrition and dietetics. After graduating, David completed a dietetic internship at the Indiana University Medical Center and subsequently fulfilled requirements to become a registered dietitian. In 1995, David completed a master's degree in clinical exercise physiology.

After completing his undergraduate and graduate degrees, David worked for several years in the educational services department at The National Institute for Fitness and Sport. In 1998, he accepted the program director position at the Indiana University Center for Weight Management. In 2001, David left the medical center to begin the doctoral program in clinical psychology at Louisiana State University. During his time as a student he worked as a dietitian/exercise physiologist at the Pennington Biomedical Research Center. After completing required coursework at Louisiana State University, David moved to Charleston, South Carolina, where he completed a pre-doctoral internship at the Medical University of South Carolina.

David currently lives with his family in Carmel, Indiana, and works in the bariatric department at St. Vincent Carmel Hospital. In this position, David has a variety of responsibilities related to health promotion for overweight adults and children.